ELECTRICAL REVIEW

FIFTY YEARS OF POWER

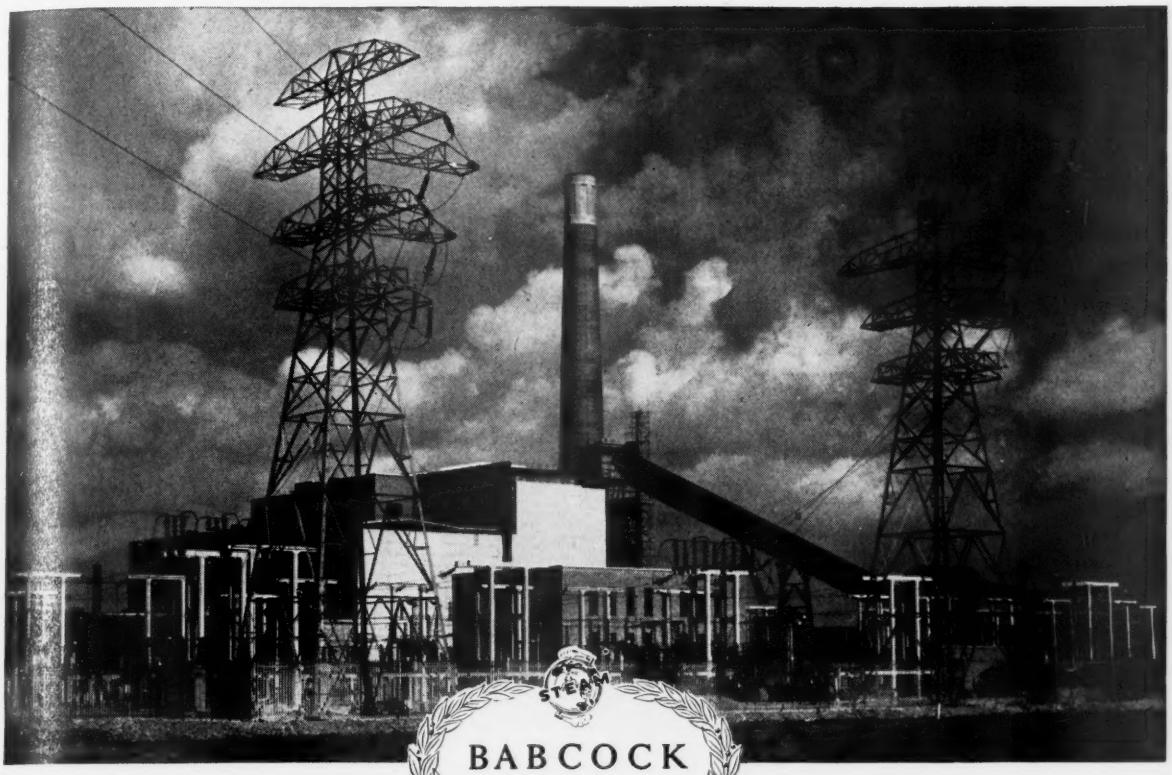
1904 BROOK MOTORS LTD. 1954

THE WORLD'S LARGEST EXCLUSIVE MAKERS OF A.C. ELECTRIC MOTORS FROM 1/8th TO 350 H.P.

Approved

Stanton 8K Spun Concrete Lighting Columns (shown in our picture) form part of the Stanton range approved by the Council of Industrial Design or passed by the Royal Fine Art Commissions.

THE STANTON IRONWORKS COMPANY LIMITED—NEAR NOTTINGHAM

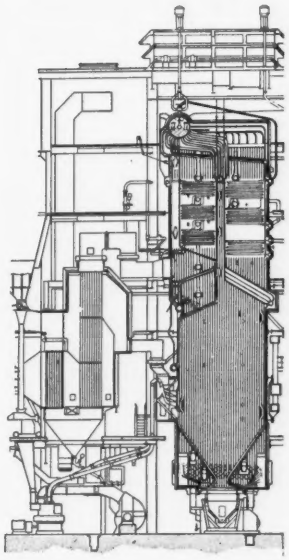


CARRINGTON POWER STATION

B.E.A. NORTH WESTERN DIVISION

The Babcock boilers at the new 240 MW. Carrington power station are Radiant units, each with an evaporation of 360,000 lb. hr. at 940 lb./sq. in. and 920°F., and fired with pulverized coal by means of eight horizontal intertube burners.

The contract includes all the coal pulverizing plant, comprising 28 Babcock type E mills to feed seven boilers.

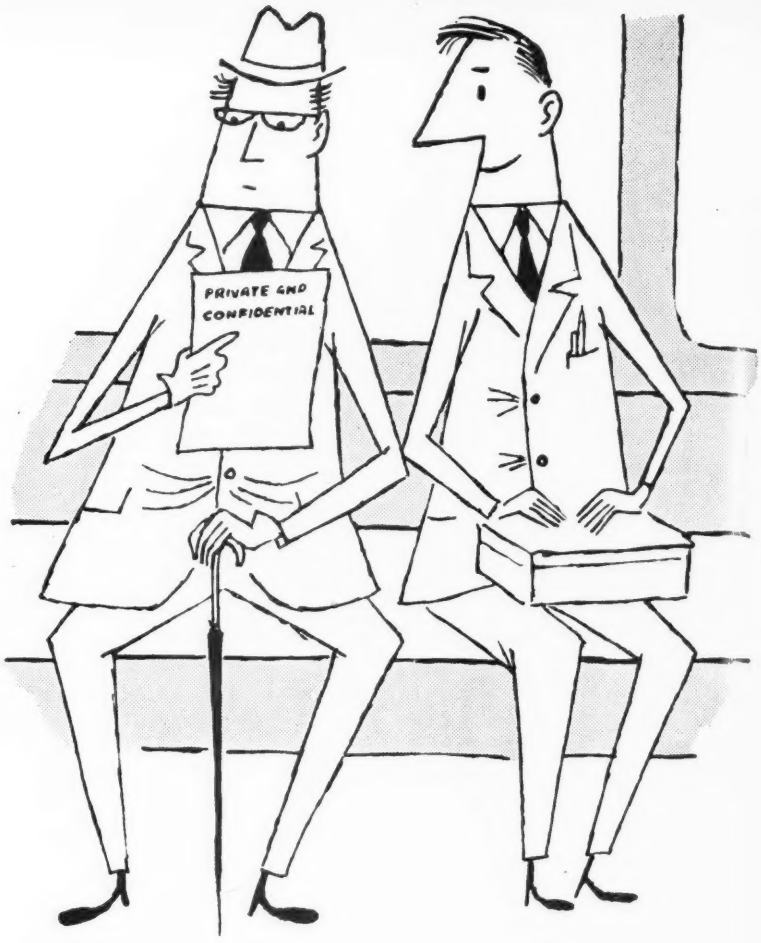


Ash, collected in the 'A' type water-filled hoppers is discharged to sump by the "*Hydrojet*" system, being pumped to settling ponds by "*Hydroseal*" ash pumps. Dust is extracted from the precipitator and air-heater hoppers by the "*Hydrovac*" system. All this is Babcock equipment, widely used in both power station and industrial installations.

Babcock & Wilcox, the world's largest manufacturers of steam-raising plant, offer to steam users large or small a comprehensive, world-wide service embracing everything for steam generation from fuel handling to ash and dust disposal.

BABCOCK & WILCOX LTD. BABCOCK HOUSE, FARRINGDON STREET, LONDON, E.C.4.

A



This makes good reading

Crompton Parkinson "Tong-Test" ammeters have been evolved not only to give readings of the current passing through an insulated wire but also to give readings that are of a very high degree of accuracy. With the "Tong-Test" you get an accuracy of ± 1 per cent of full scale deflection. This accuracy is the result of individual calibration of each separate "Tong-Test" dial and is a characteristic to be found in every instrument we manufacture.

NOTE TO STOCKISTS. Movements can be interchanged between different "Tong-Tests", but this means the sacrifice of high accuracy. Would you like full details?

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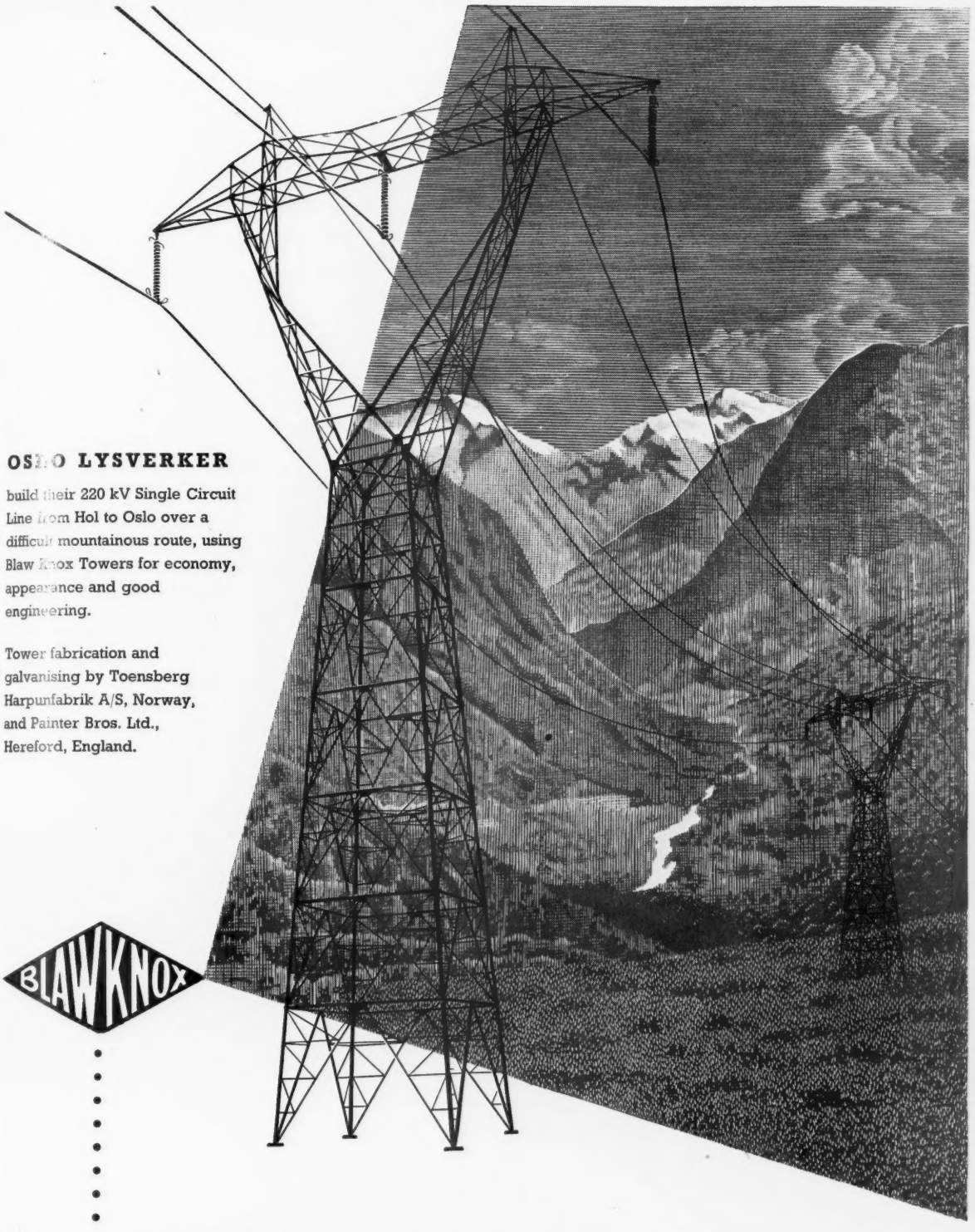

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build their 220 kV Single Circuit Line from Hol to Oslo over a difficult mountainous route, using Blaw Knox Towers for economy, appearance and good engineering.

Tower fabrication and galvanising by Toensberg Harpunfabrik A/S, Norway, and Painter Bros. Ltd., Hereford, England.

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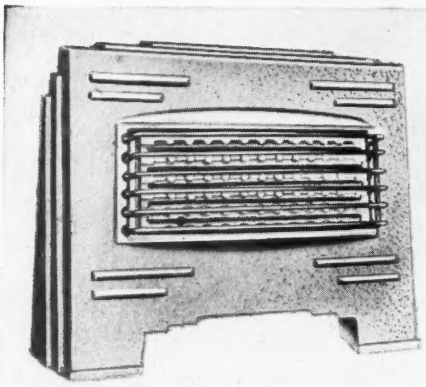

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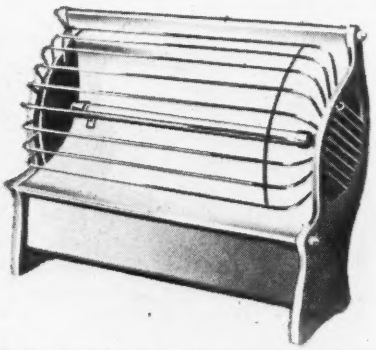

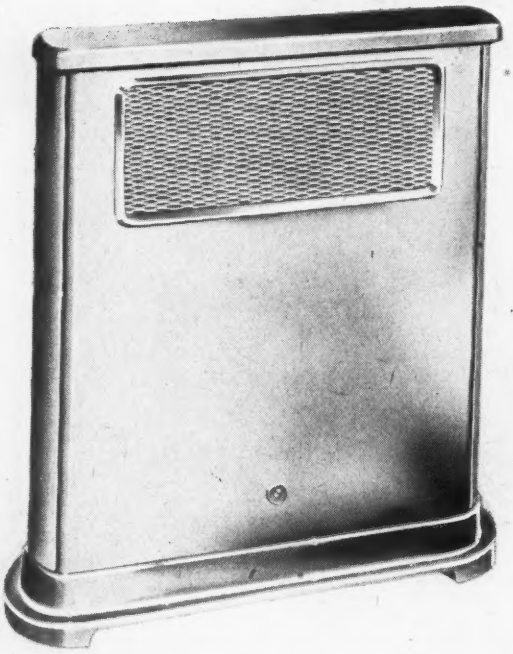

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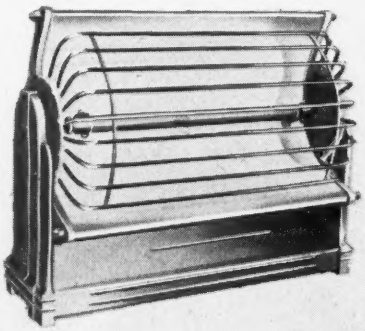

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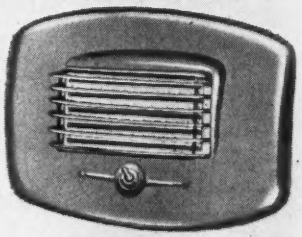

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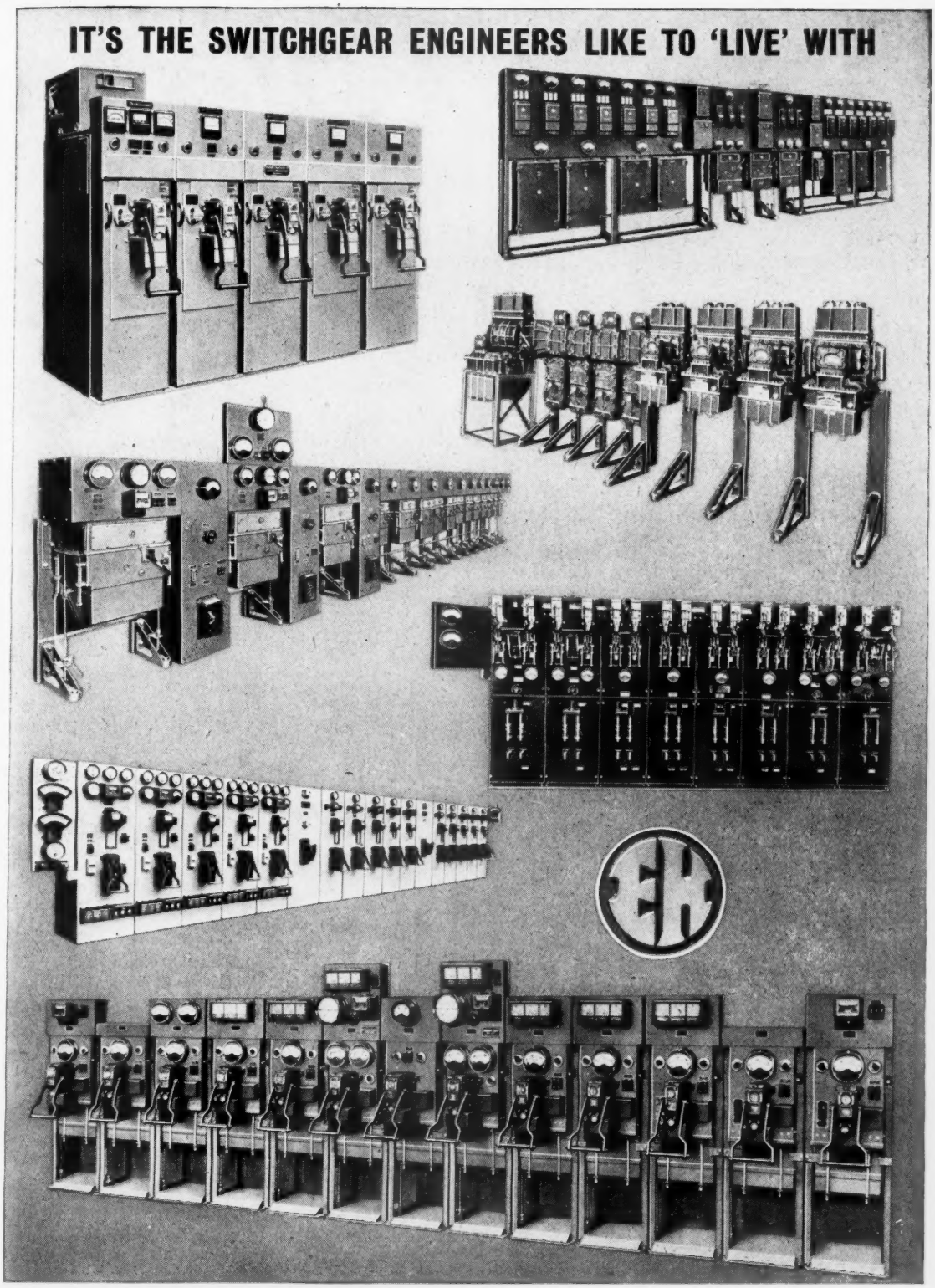

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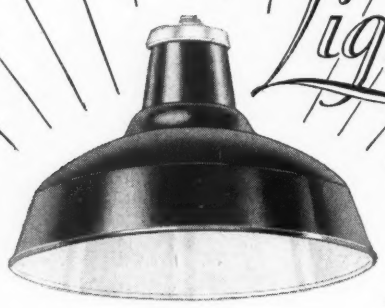

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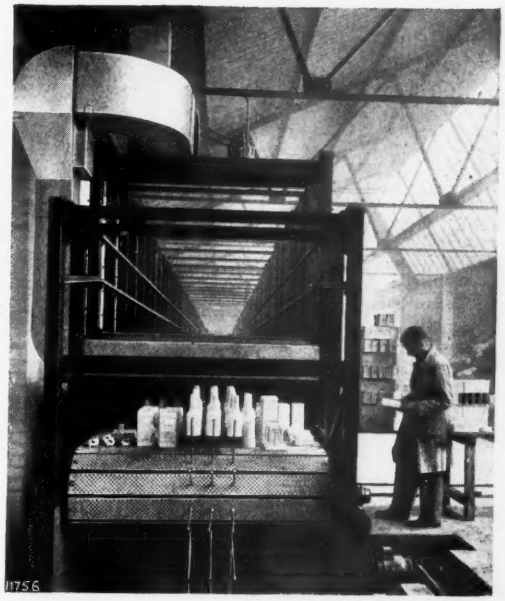
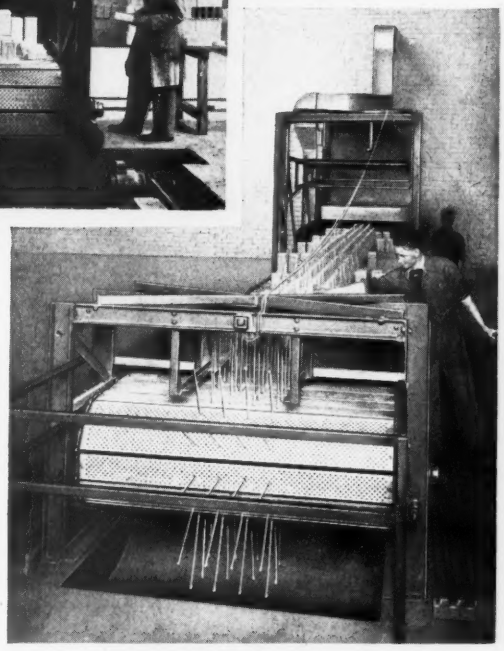


For all problems involving mechanical and controlled drying



The illustration on the right shows the loading end, and above shows the unloading end, of a continuous type tunnel dryer with provision for future upper level tunnel

Please write to reference U.101/23. Details of Sturtevant Dryers will be gladly sent

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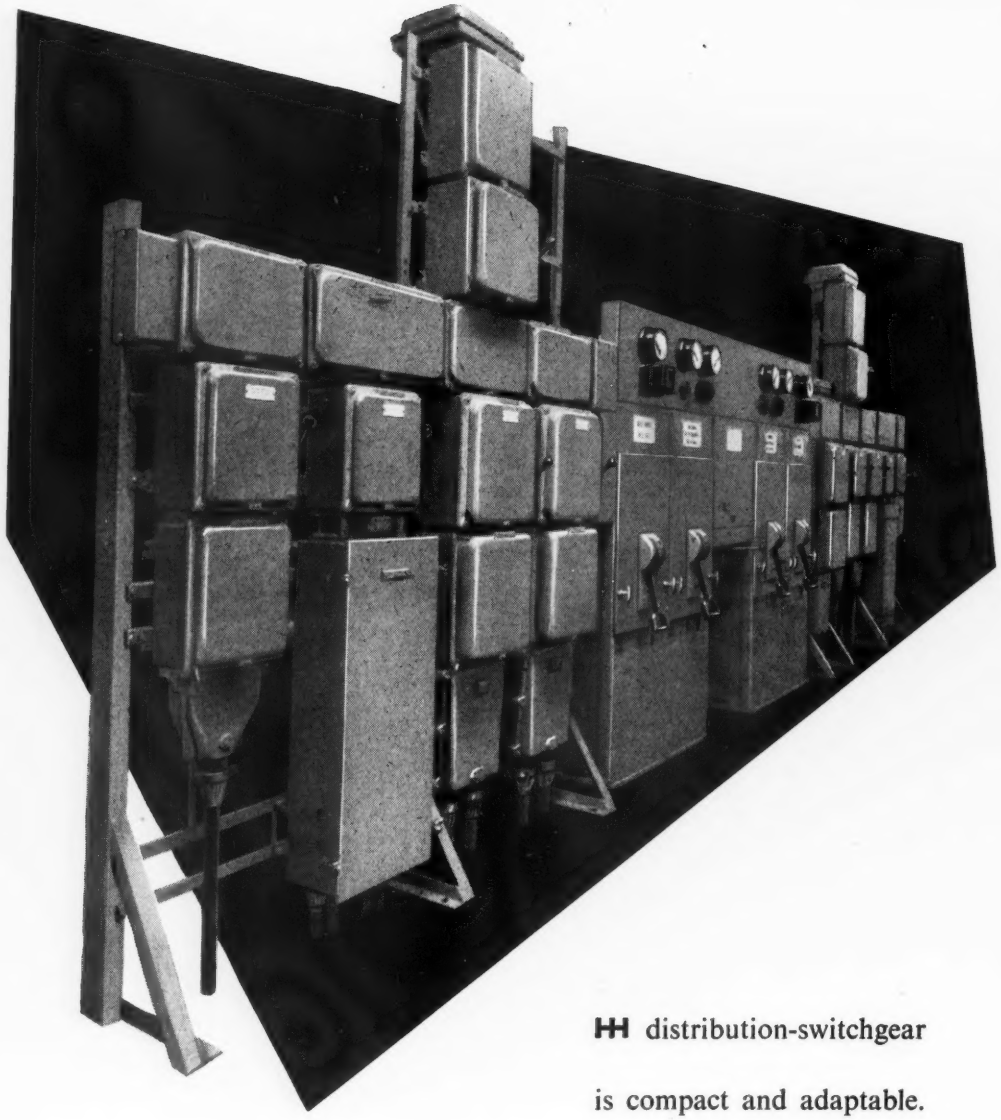

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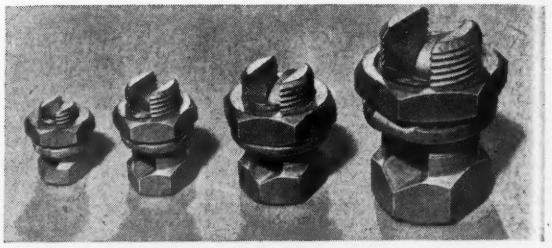
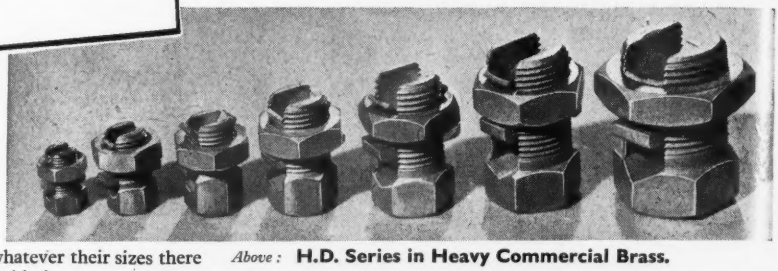
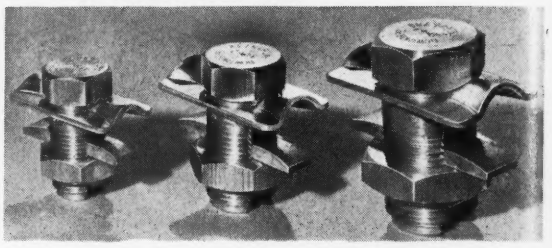


"V Series" in Naval Brass (*to BES L1 drawing No. BE/L/E4.*)



Above: **H.D. Series in Heavy Commercial Brass.**
Below: **A.L. Series in Aluminium.**



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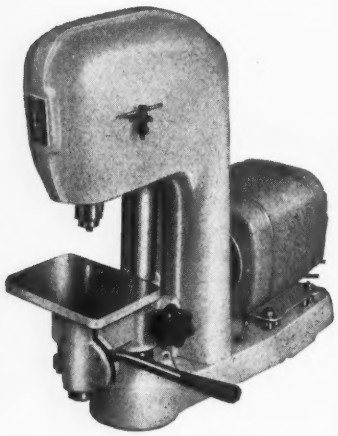

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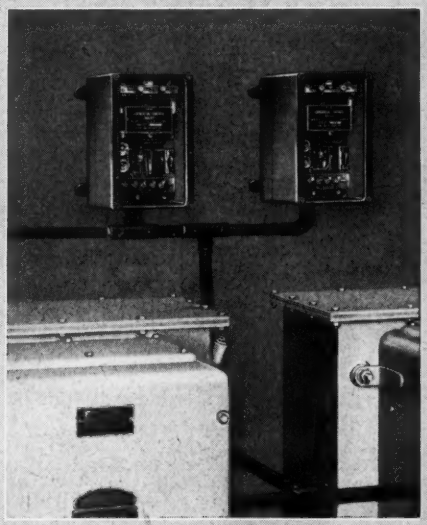

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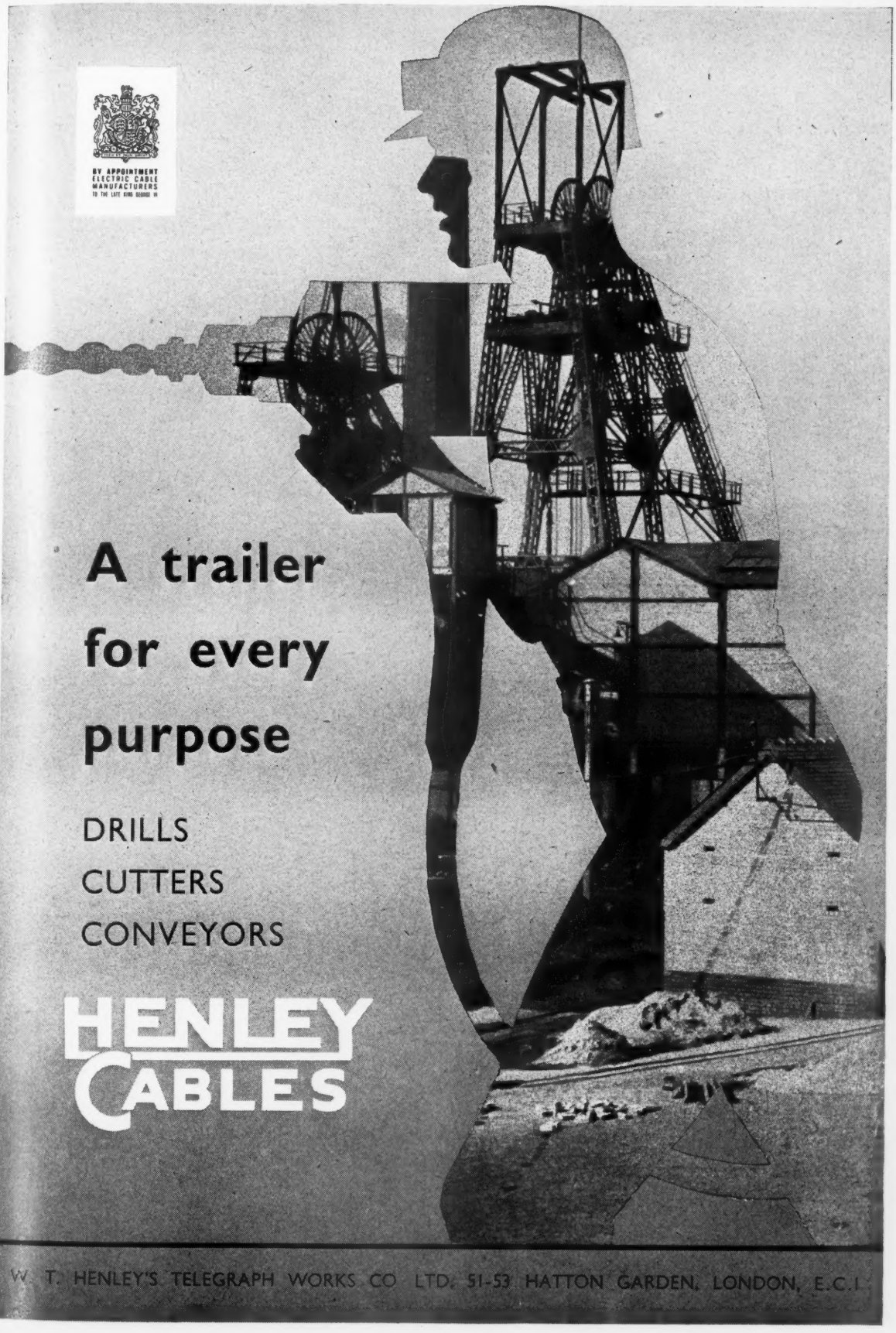
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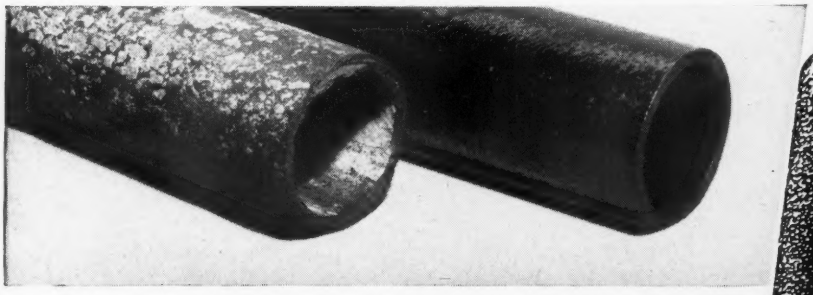

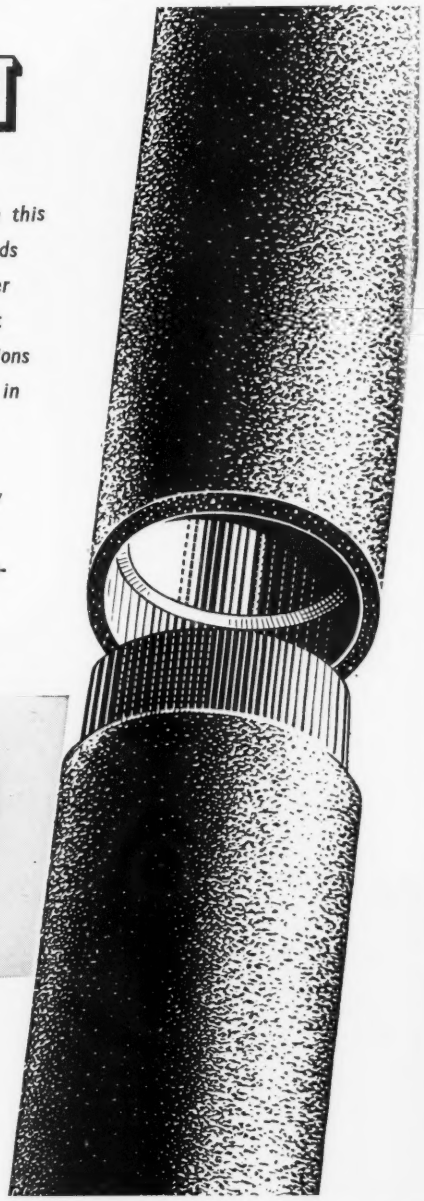

*Other Key points are: *Extreme lightness, effecting economy in storage, cost of transport, handling and laying. *Smooth interior surface which cannot damage lead sheathed cable. *Simplicity in jointing. *Machined joints—perfectly aligned and absolutely watertight. *Fractional or nil breakage in transit. *Resilient to vibration.*

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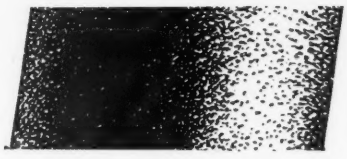

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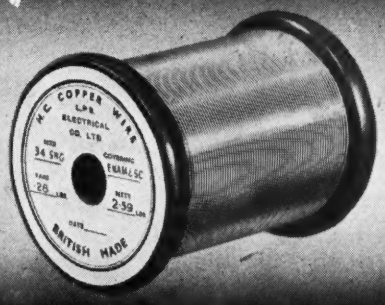

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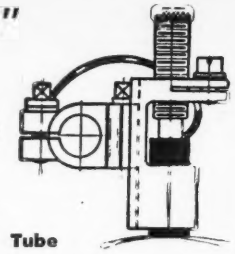

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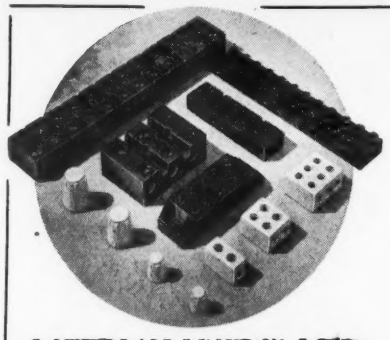

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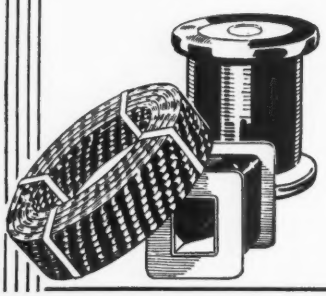

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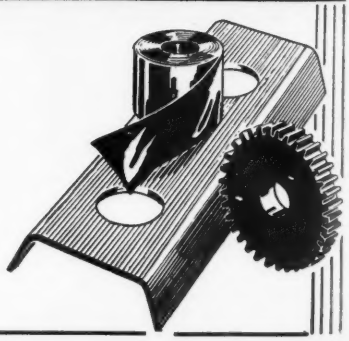

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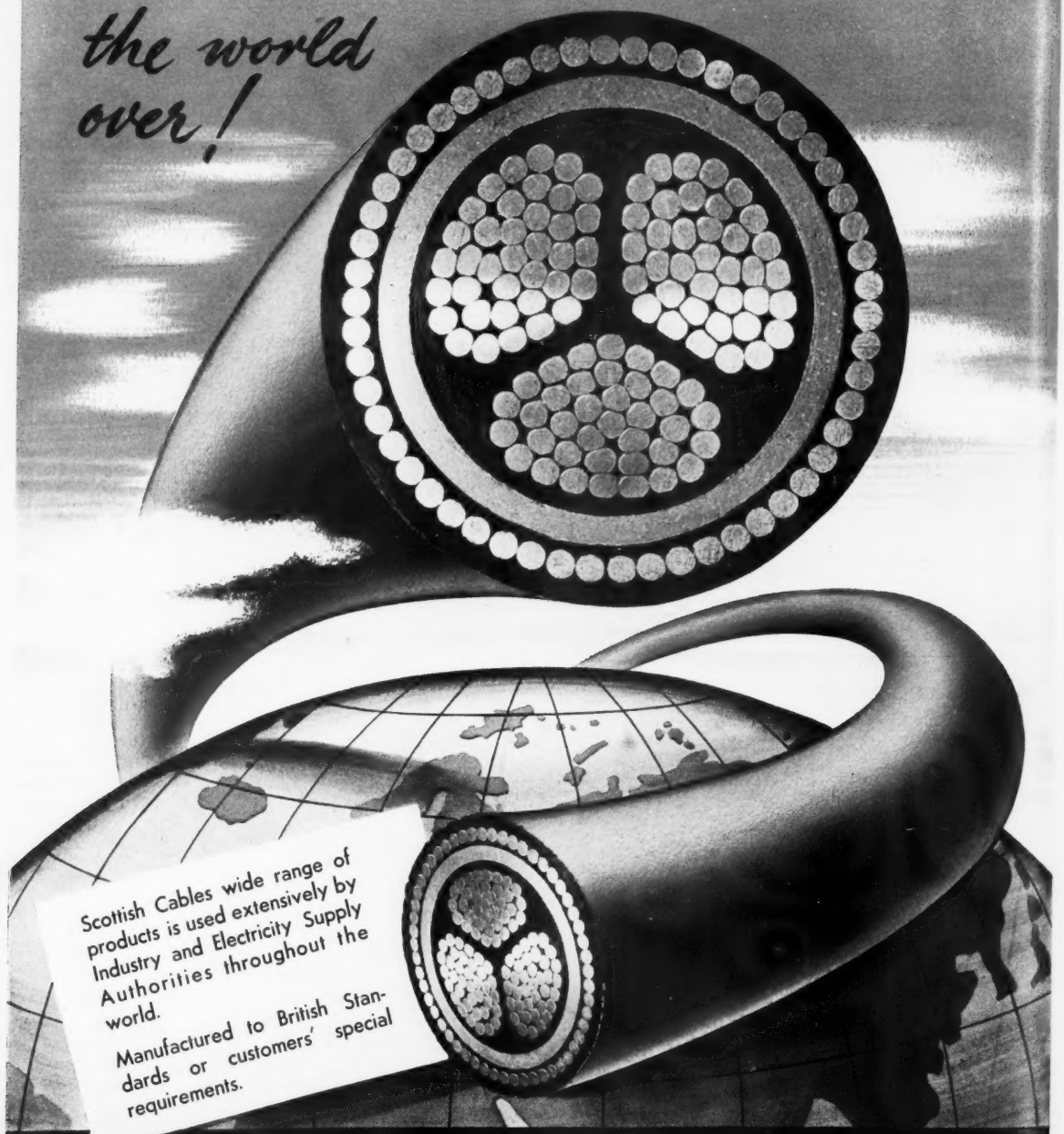

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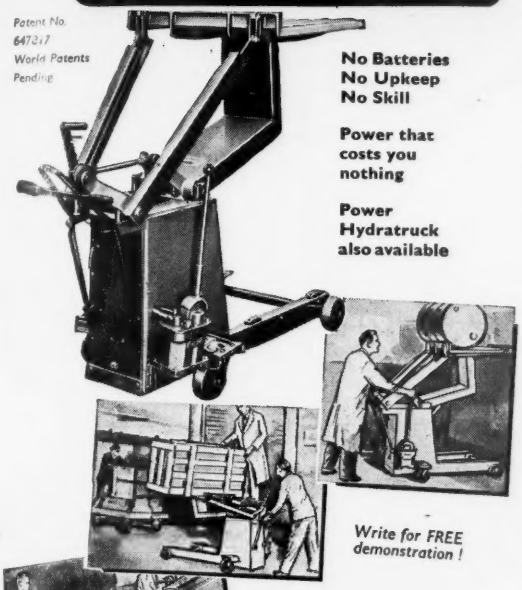

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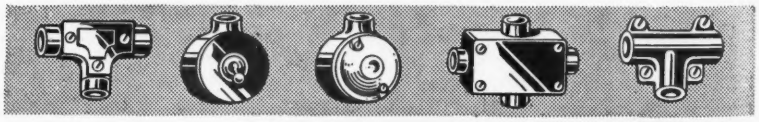

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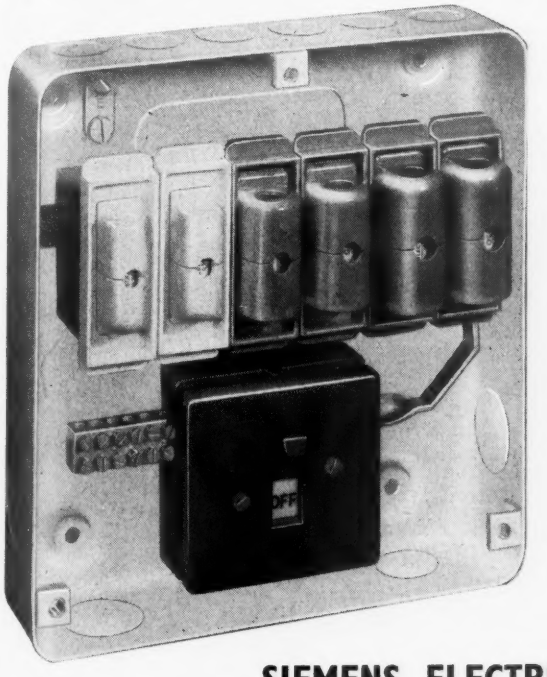

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NO. OF WAYS	METALCLAD	INSULATED	LIST PRICE WITH H.R.C. FUSES	LIST PRICE WITH REWIREABLE FUSES
			£ s. d.	£ s. d.
4 ways	F 3295/M4	F 3295/B4	3 3 0	2 19 8
5 ways	F 3295/M5	F 3295/B5	3 5 0	3 0 10
6 ways	F 3295/M6	F 3295/B6	3 7 0	3 2 0

DIMENSIONS: Metalclad Height 7⅛″ Width 6⅞″ Depth 3⅛″
Insulated Height 7⅞″ Width 7½″ Depth 3¼″

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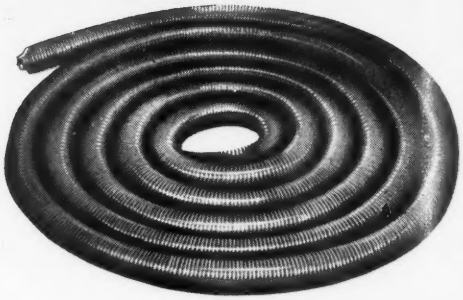

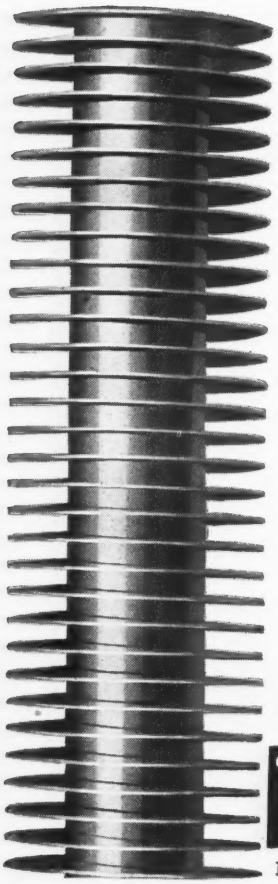

'INTEGRON' is a finned tube in which the fins are cold-formed from, and integral with, the parent tube. Made in copper, aluminium and certain alloys of these metals, 'Integron' tubing offers the advantages of strength, compactness, corrosion resistance and good heat transfer properties.

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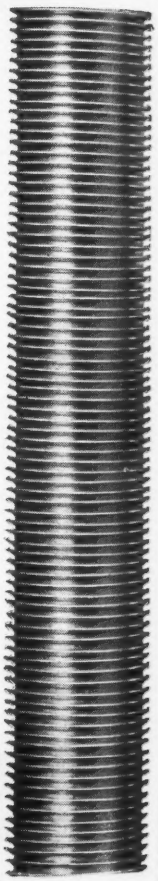
Literature available on request.



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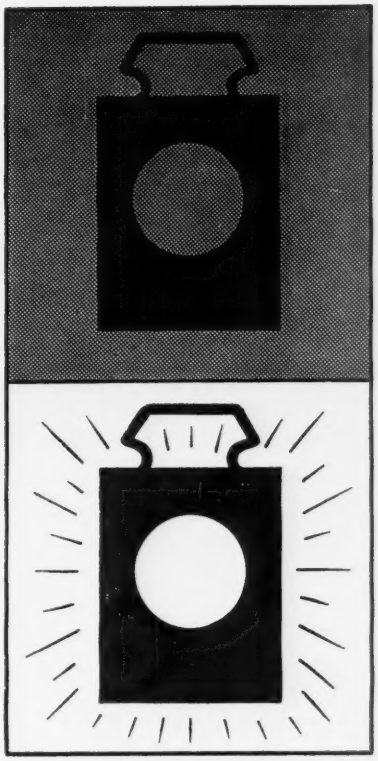

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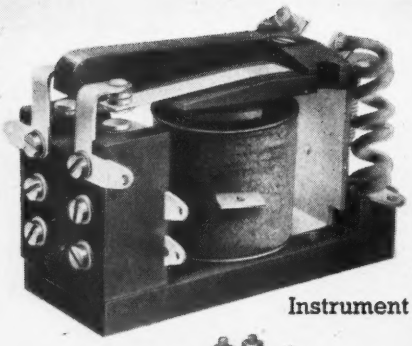
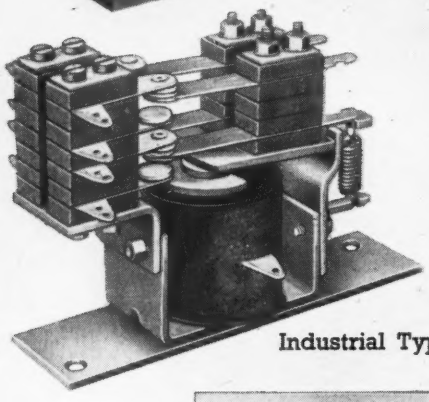
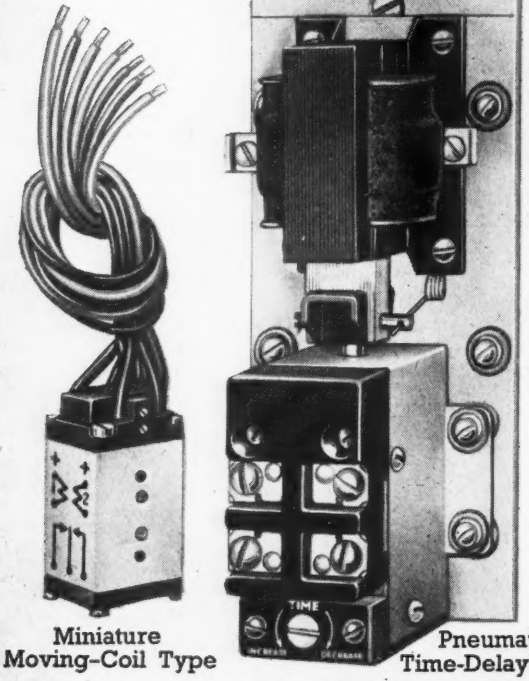
TYPE OF INDUSTRY .....



Instrument Type



Industrial Type



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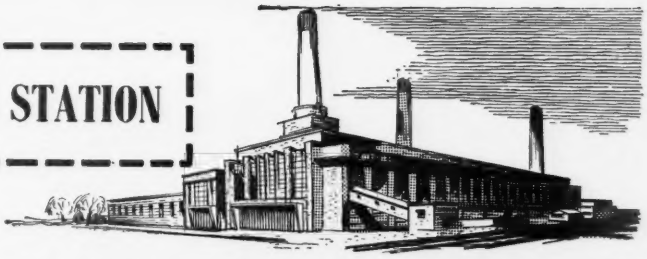
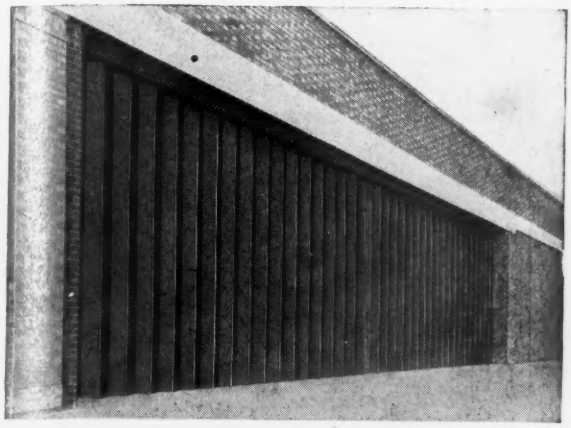


demands the MODERN SHUTTER DOOR



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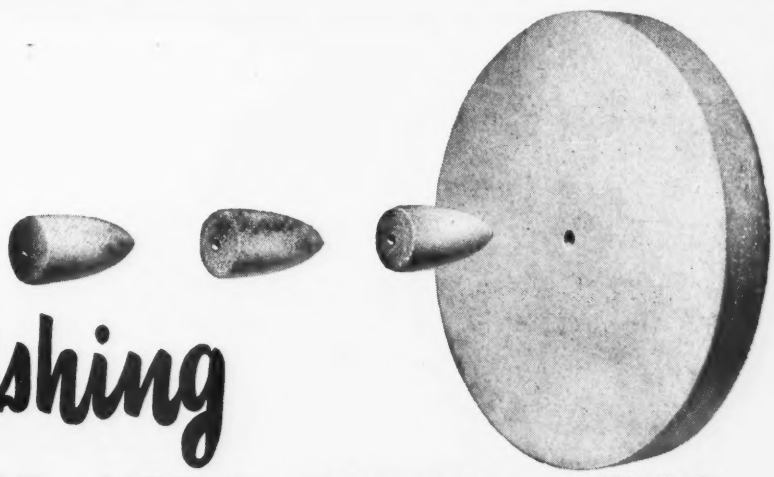

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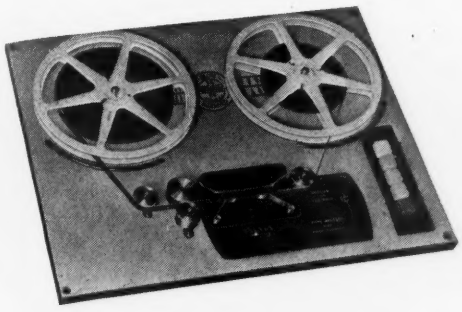
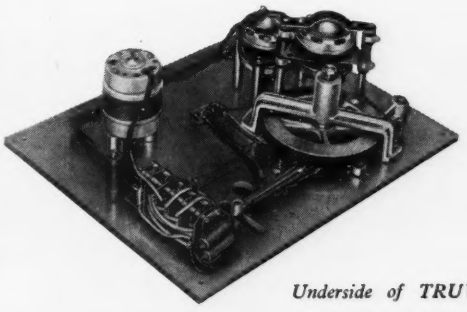
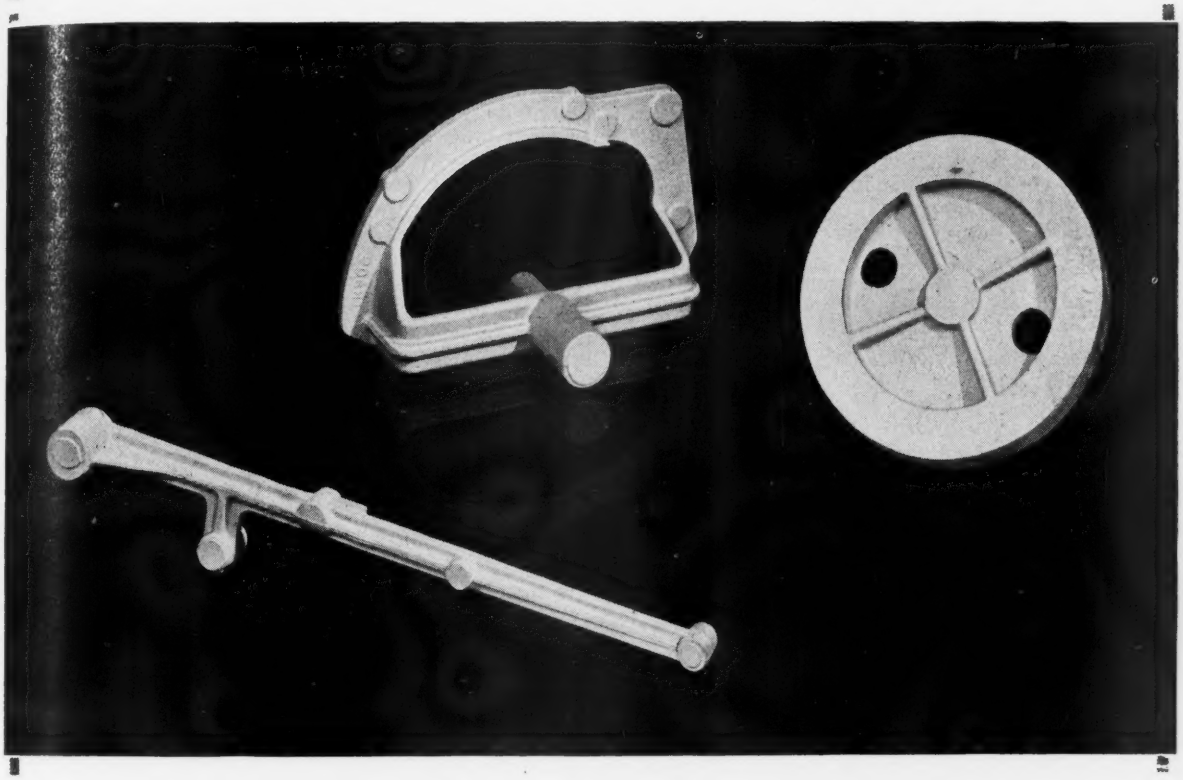


TRUVOX Tape Deck Mark III.



Underside of TRUVOX Tape Deck Mark III.

Below: Aluminium Alloy Castings for flywheel, flywheeel cradle and tape release lever.



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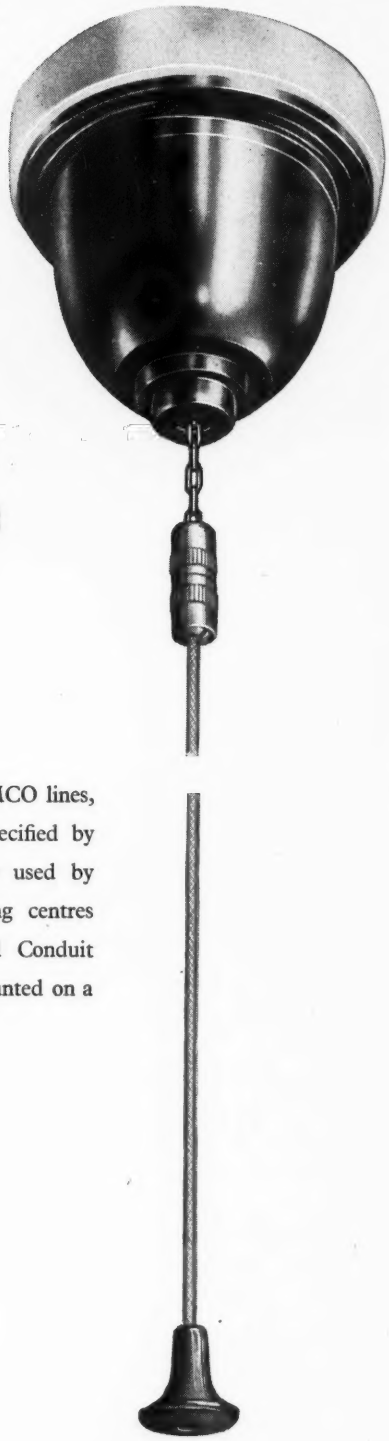

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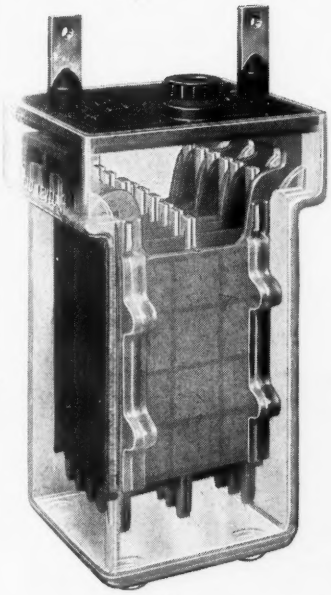

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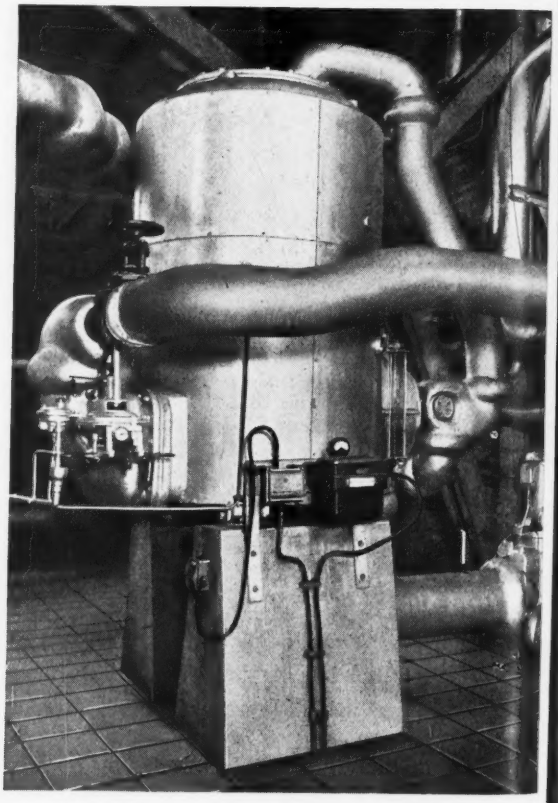

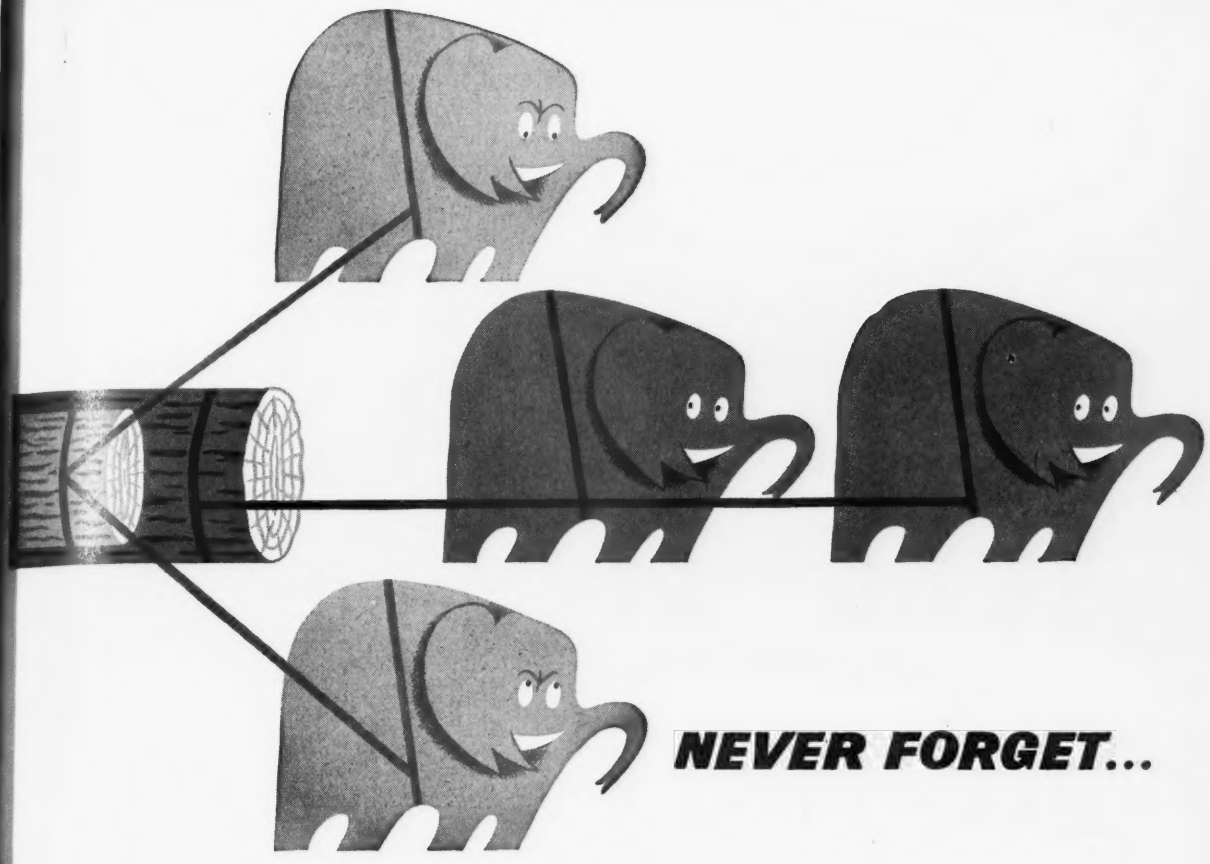

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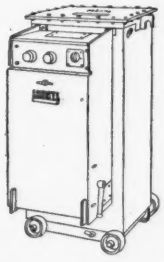

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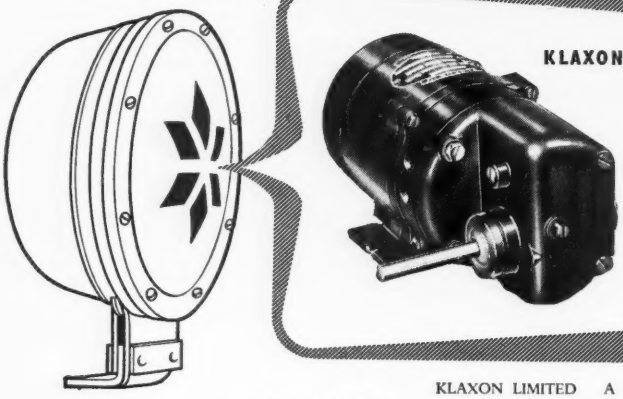

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TYPE EK-M21

This Klaxon Geared Unit is driven by the EK Motor which is made in a complete range of windings AC or DC up to 250 volts

The output speeds range from ½ r.p.m. to 80 r.p.m. with torque output between 15 and 2 pounds inches dependant upon speed.

The Klaxon range of Geared Units covers speeds from 500 r.p.m. to 1 Revolution in 24 hours at torques ranging from the smallest up to 2,500 lbs. inches for continuous duty.

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1. It is large enough (80" × 60" or 80" × 70") to tuck in all round the bed.
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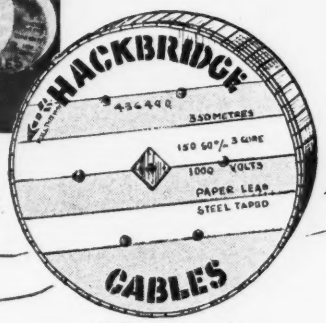

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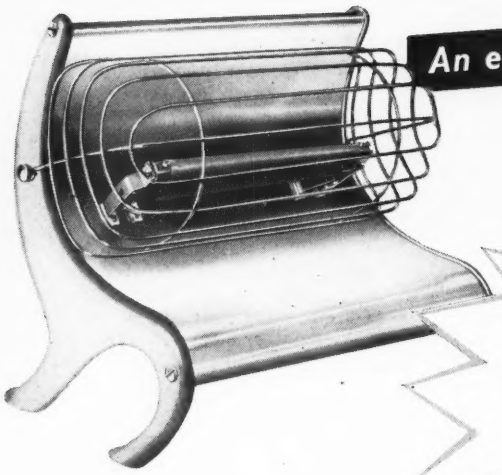

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Just slide on the Abcon fitting, tighten up, and the joint is made.

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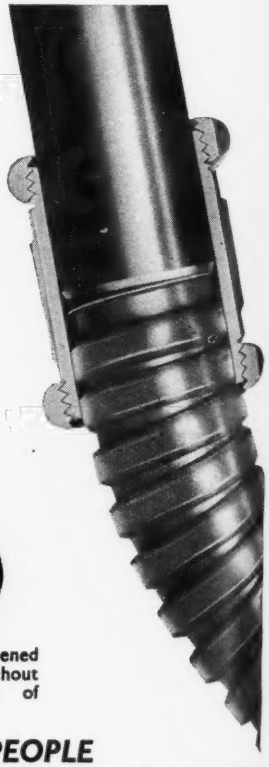
HOW IT WORKS. Tightening of the taper-threaded nut tightly contracts the slotted end of the ABCON fitting to the conduit.



For joining rigid to flexible conduit (of same outside diameter of rigid conduit).

For joining rigid to rigid (no screwing of conduit required)

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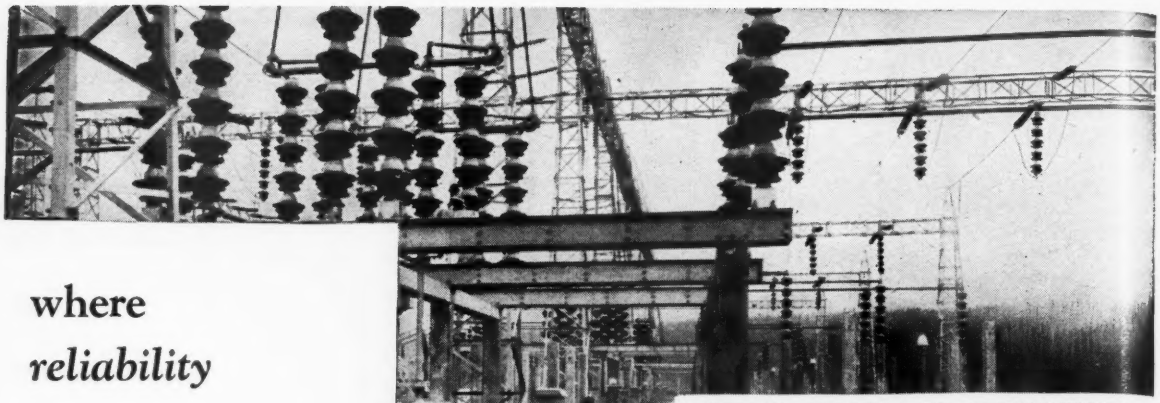

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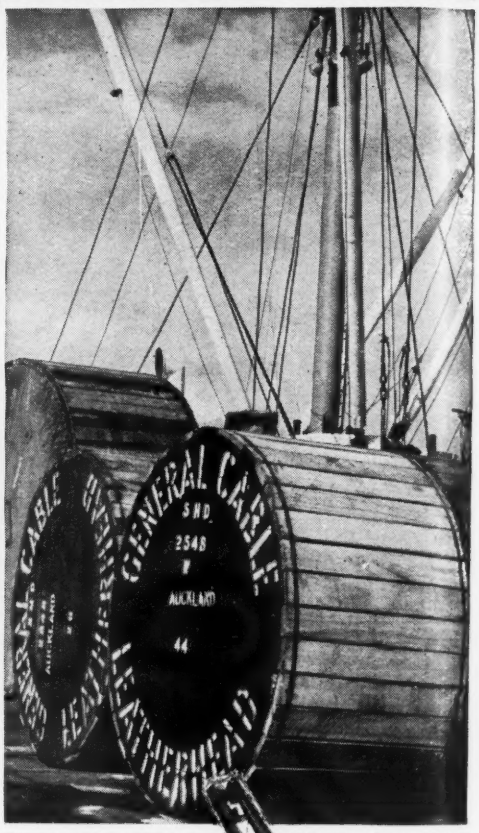

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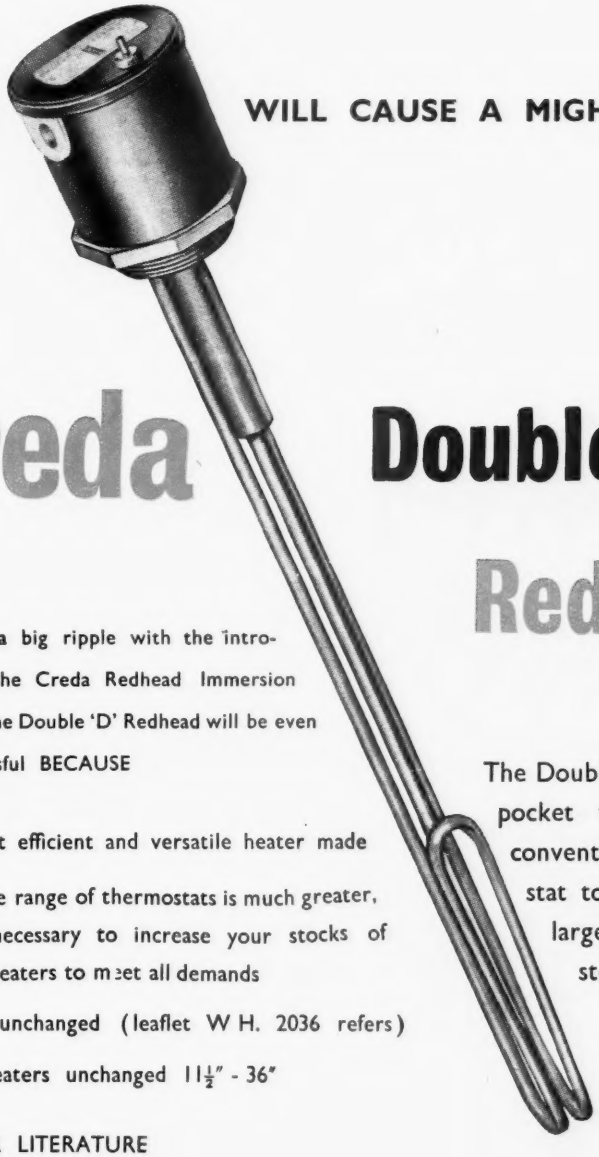

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We caused a big ripple with the introduction of the Creda Redhead Immersion Heater and the Double 'D' Redhead will be even more successful BECAUSE

★ It's the most efficient and versatile heater made

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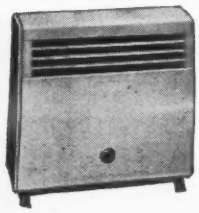
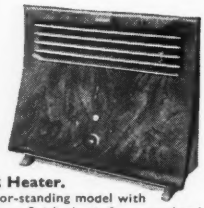
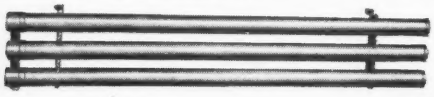


Steel-cased SR Heaters. Handsome floor-standing type with metal case finished in light bronze enamel, fitted with luminous effect. Available in 1, 2 and 3 Kw loadings with or without Automatic Heat Control. From **£8.17.7**



FR Heater. Floor-standing model with walnut finish plastic front panel and warm luminous effect behind 'old gold' metal grilles. In 1 Kw-2 Kw loadings. With or without Automatic Heat Control. From **£9.11.3**



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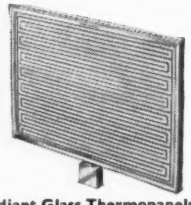

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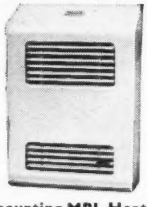

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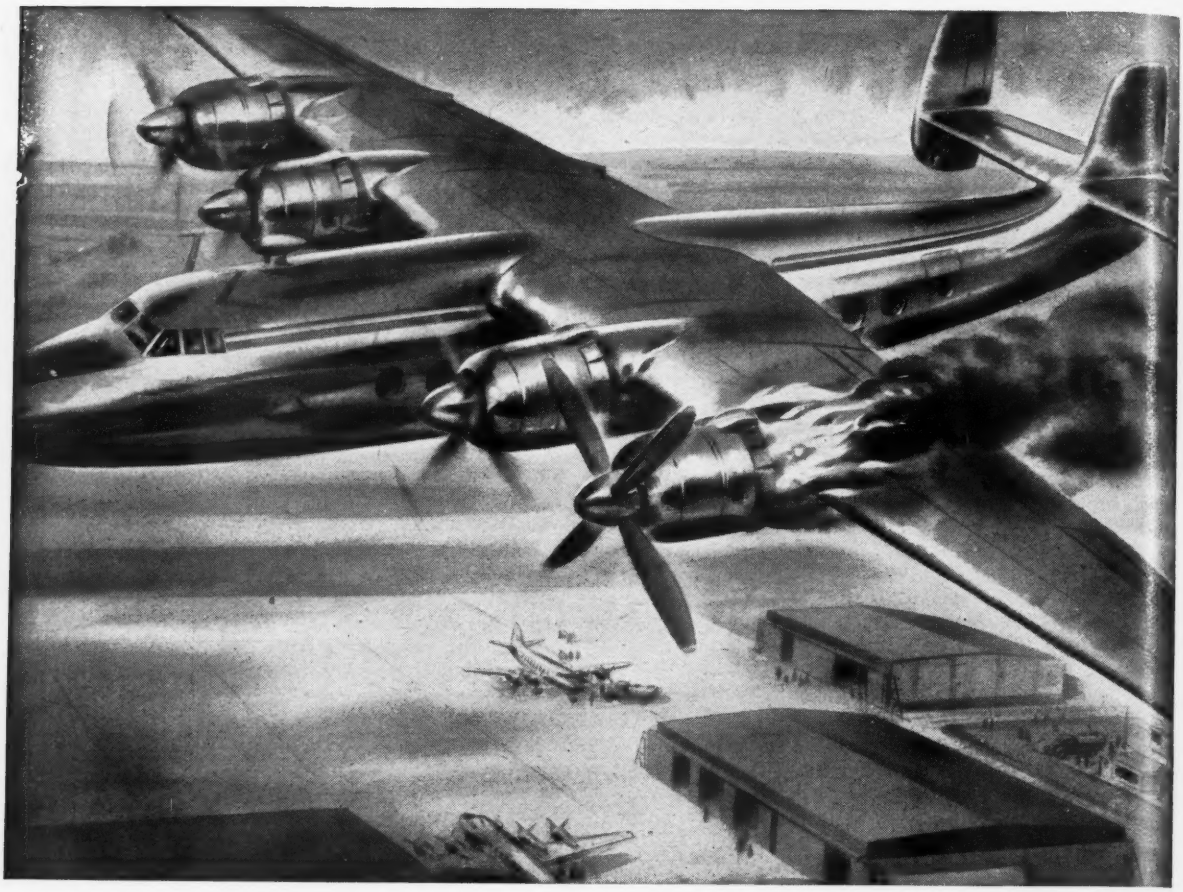

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Today it probably means no more than an extra job for the ground staff—for modern multi-engined aircraft will fly with one or more engines shut-down . . . provided the controls to the remaining engines are intact. This is one reason why most aircraft use 'Fibreglass' insulated Pren* cables which stand up to direct exposure to flame. Other reasons — which apply to all 'Fibreglass' electrical insulation — are less weight, less space, greater heat resistance, higher safe working-temperatures, freedom from alkali with consequent resistance to moisture. All of which mean longer life and greater reliability.

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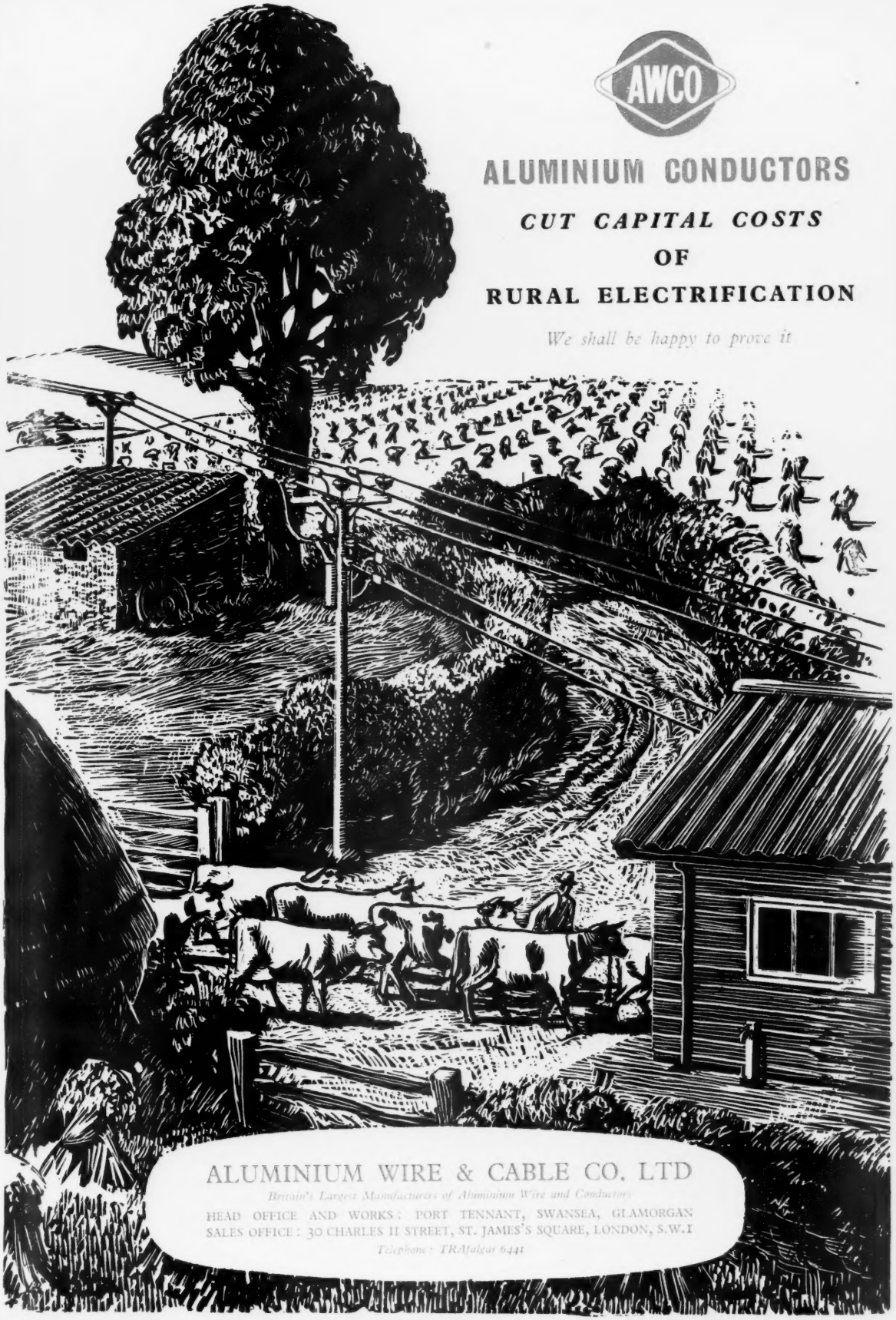

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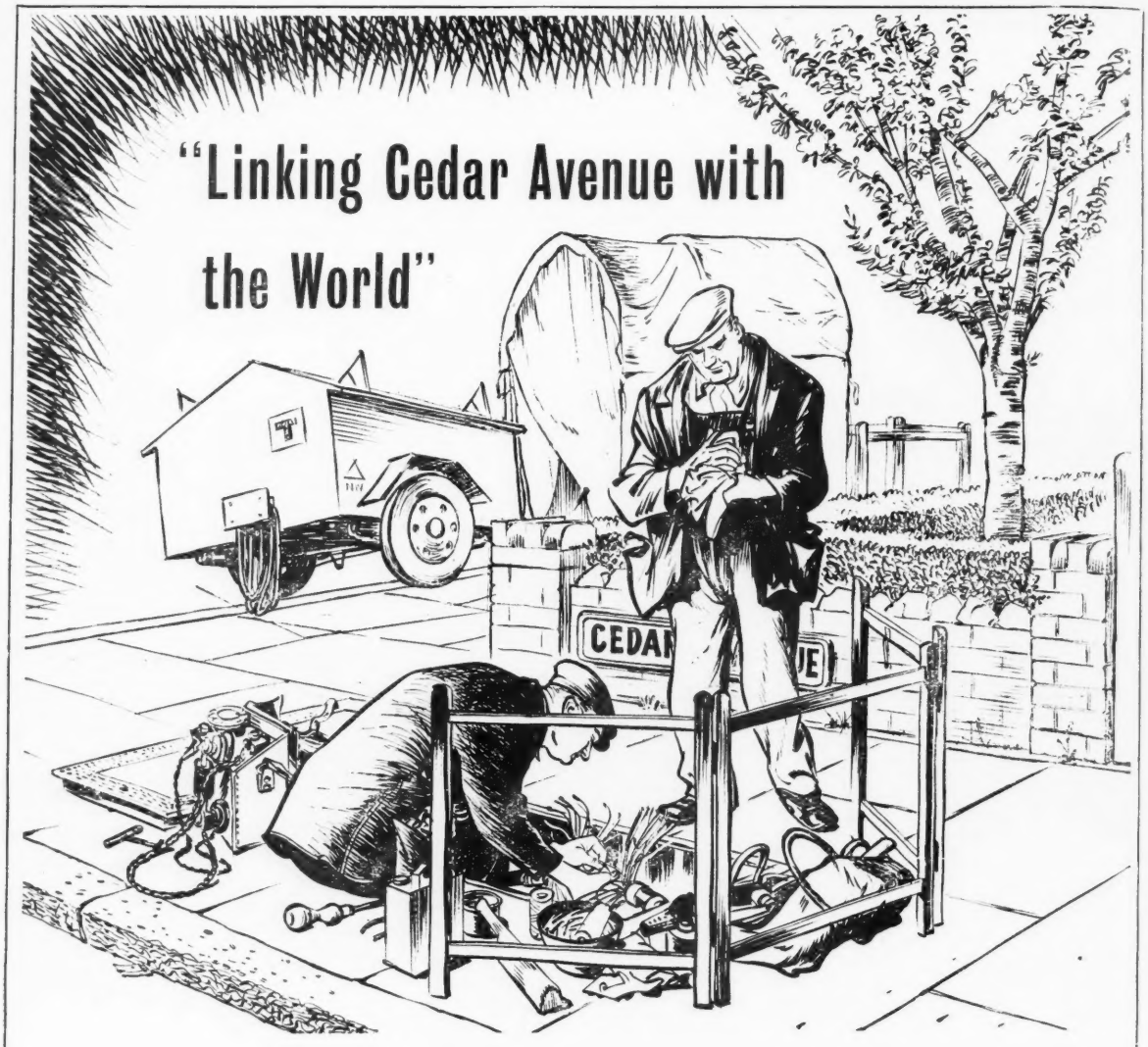

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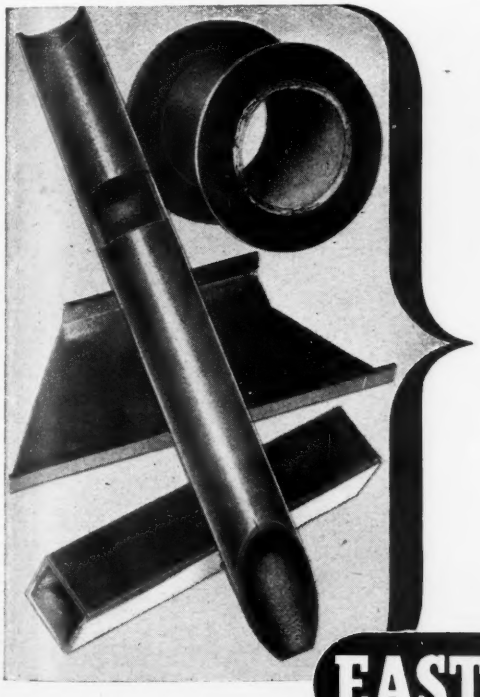

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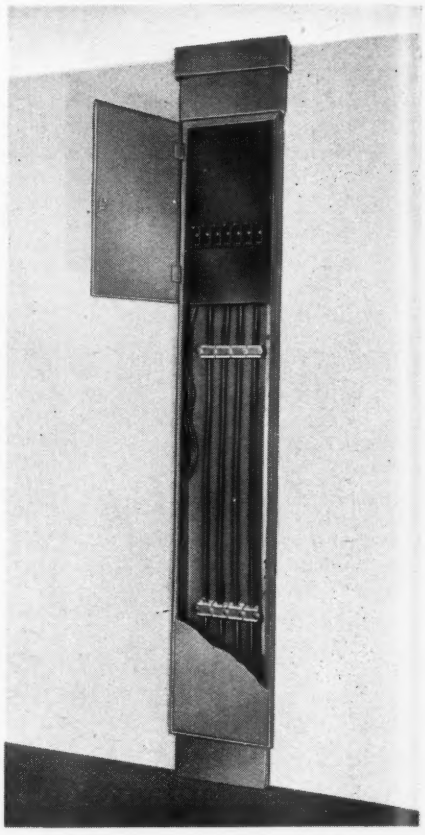

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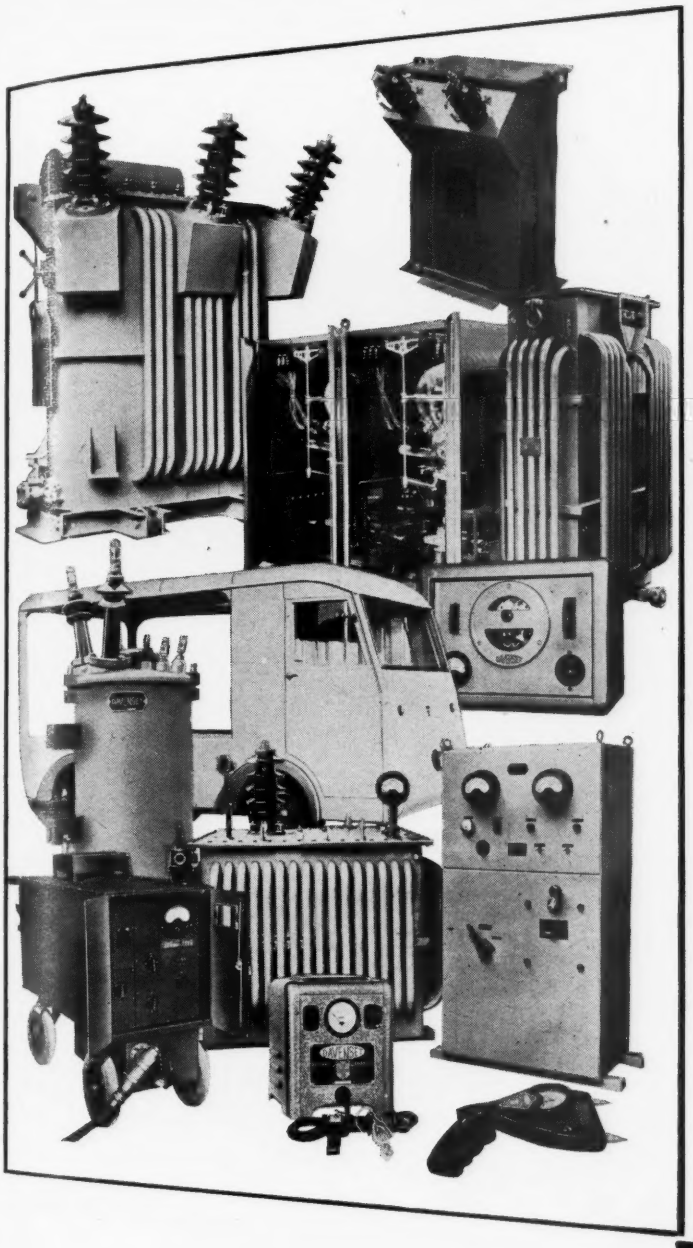

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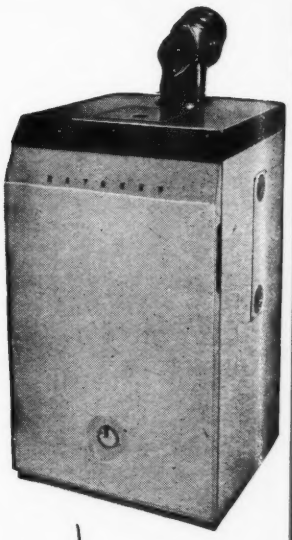

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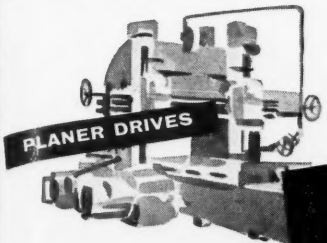

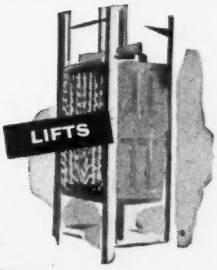

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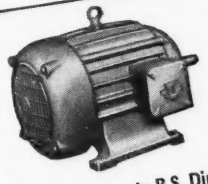
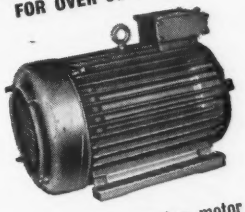
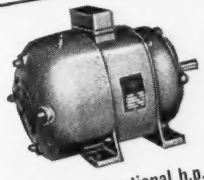


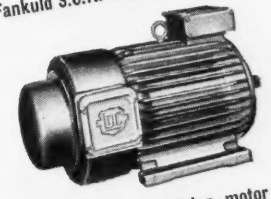
'Fankuld' 10 h.p. motor to B.S. Dimensions



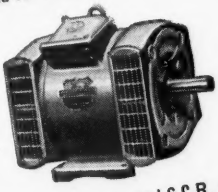
'Fankuld' S.C.R. 20 h.p. motor



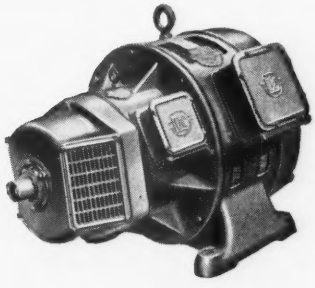
'Fankuld' S.C.R. Fractional h.p. motor



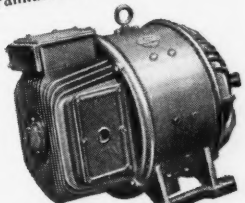
'Fankuld' Slip Ring 20 h.p. motor



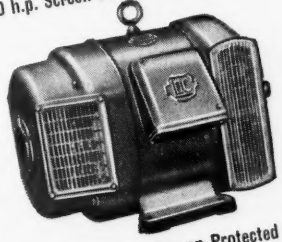
30 h.p. Screen Protected S.C.R. motor



'Tandem' Lift motor



D.C. Gasworks 20 h.p. motor



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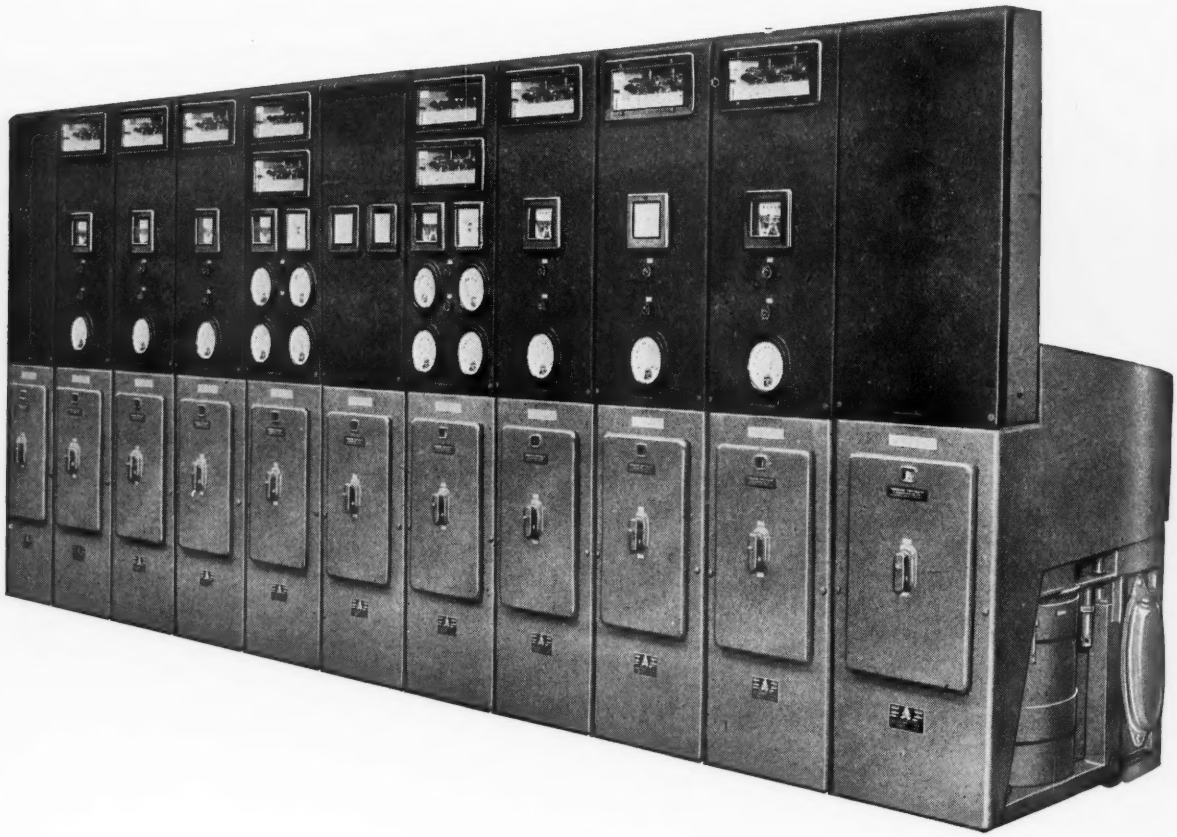

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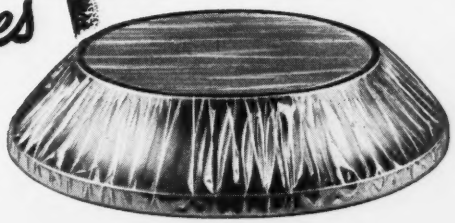

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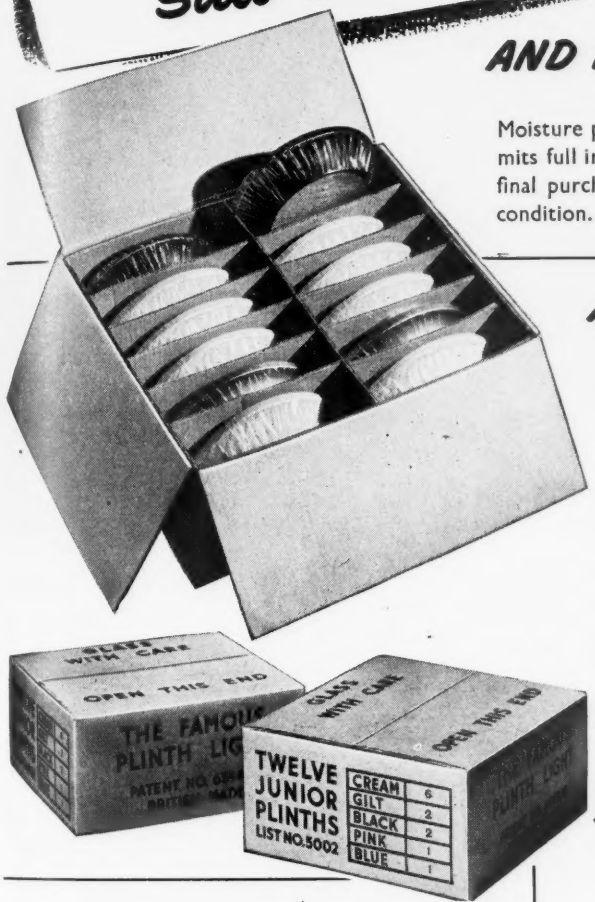

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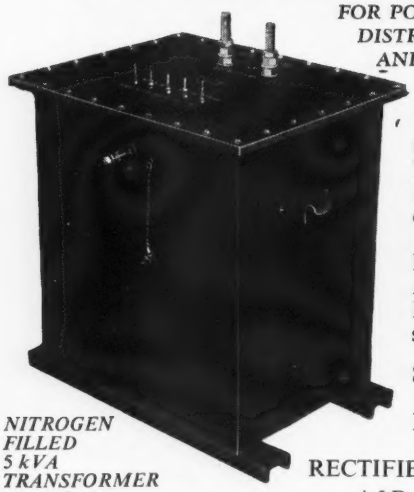

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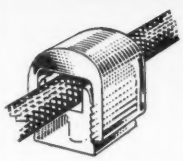

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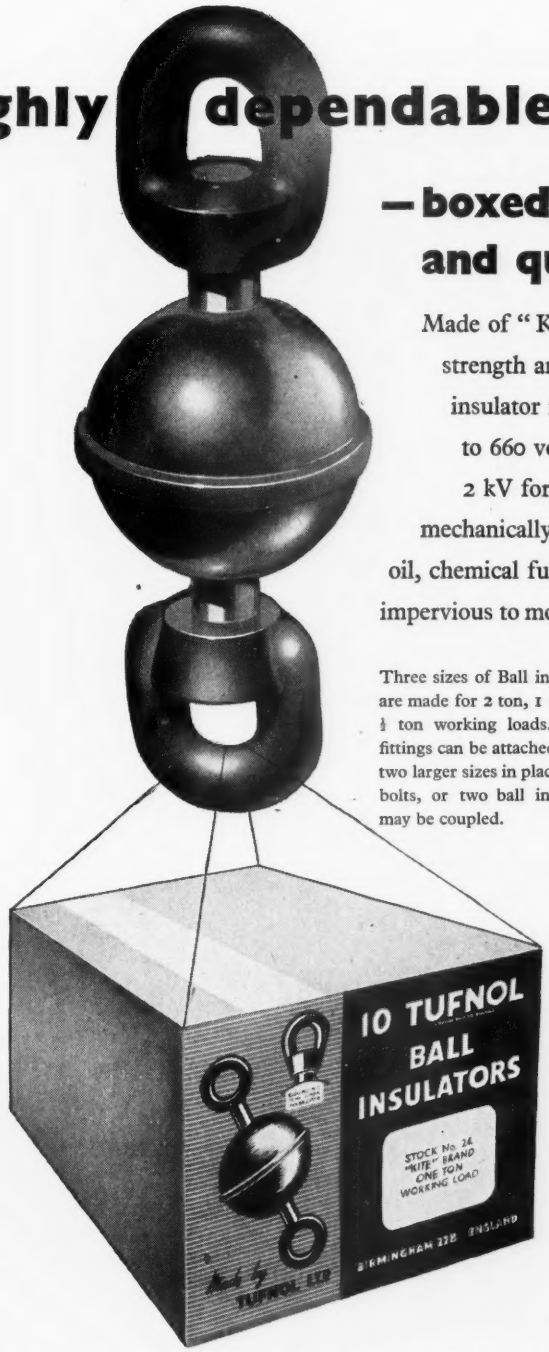

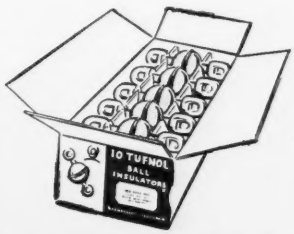

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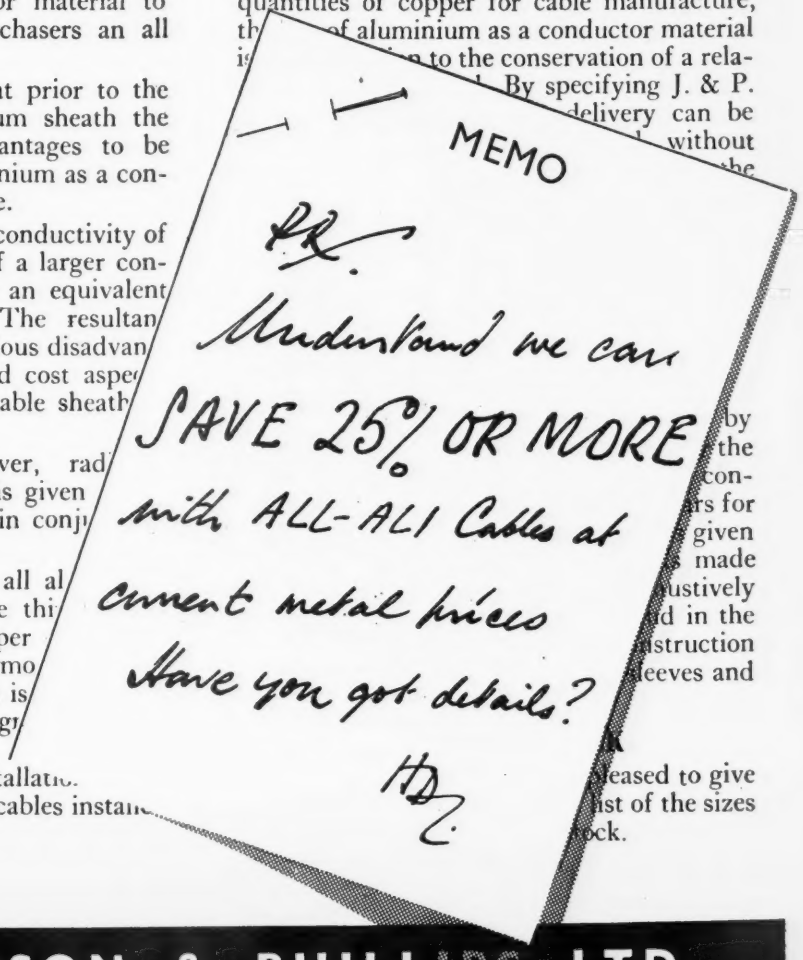

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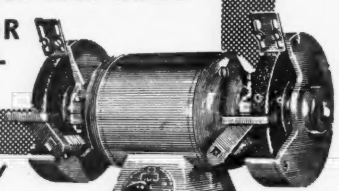

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Distance from centre of spindle to outer casing	1⅝″	1⅝″	1⅝″
Nett Weight, lb.	17	17½	18

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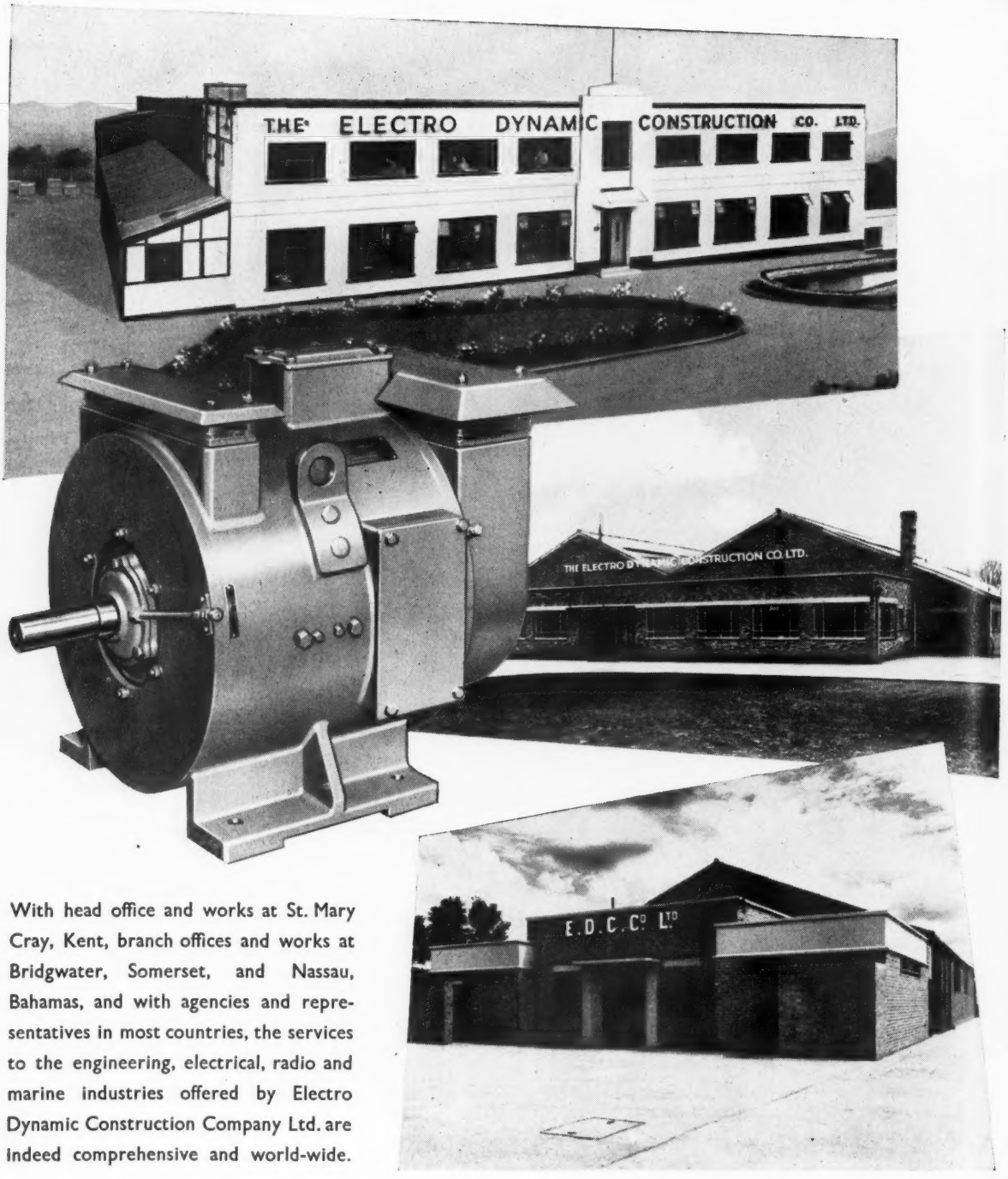

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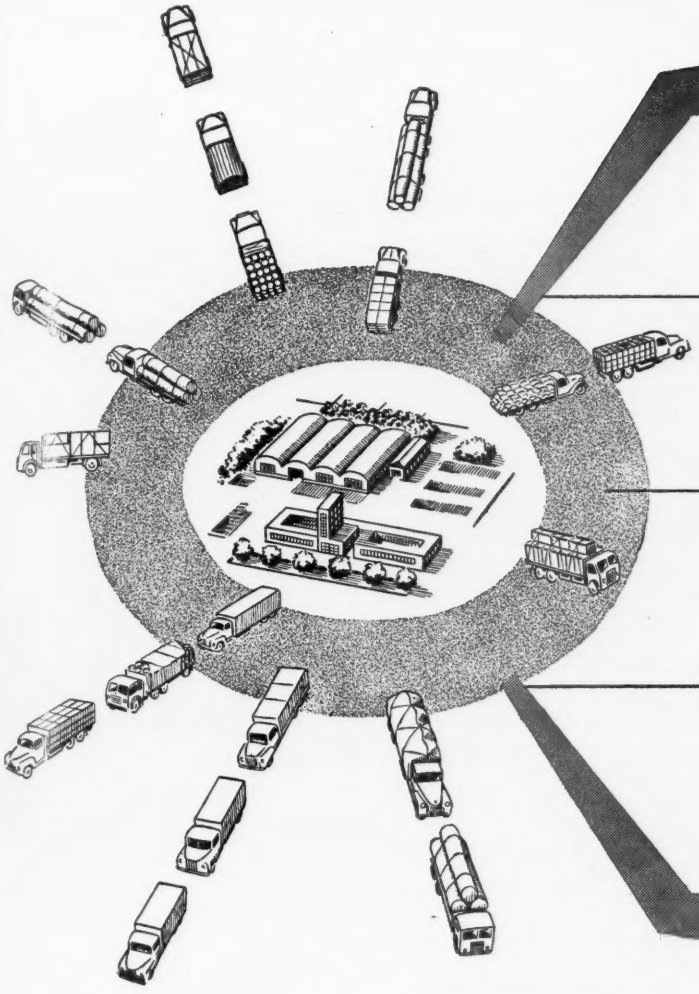

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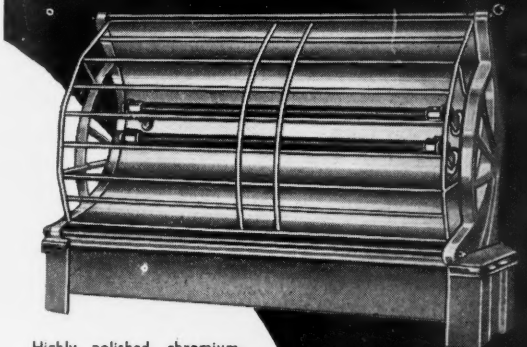

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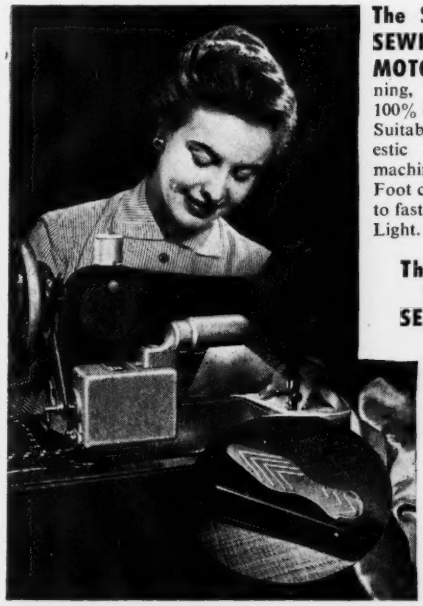

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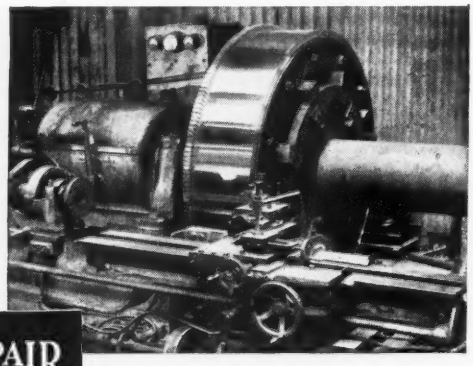

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Illustrated are two stages in the manufacture of a 6 ft. diameter solid riser type commutator. The photographs show (top) the machining of the Vees and (bottom) after machining of the brush surface diameter.

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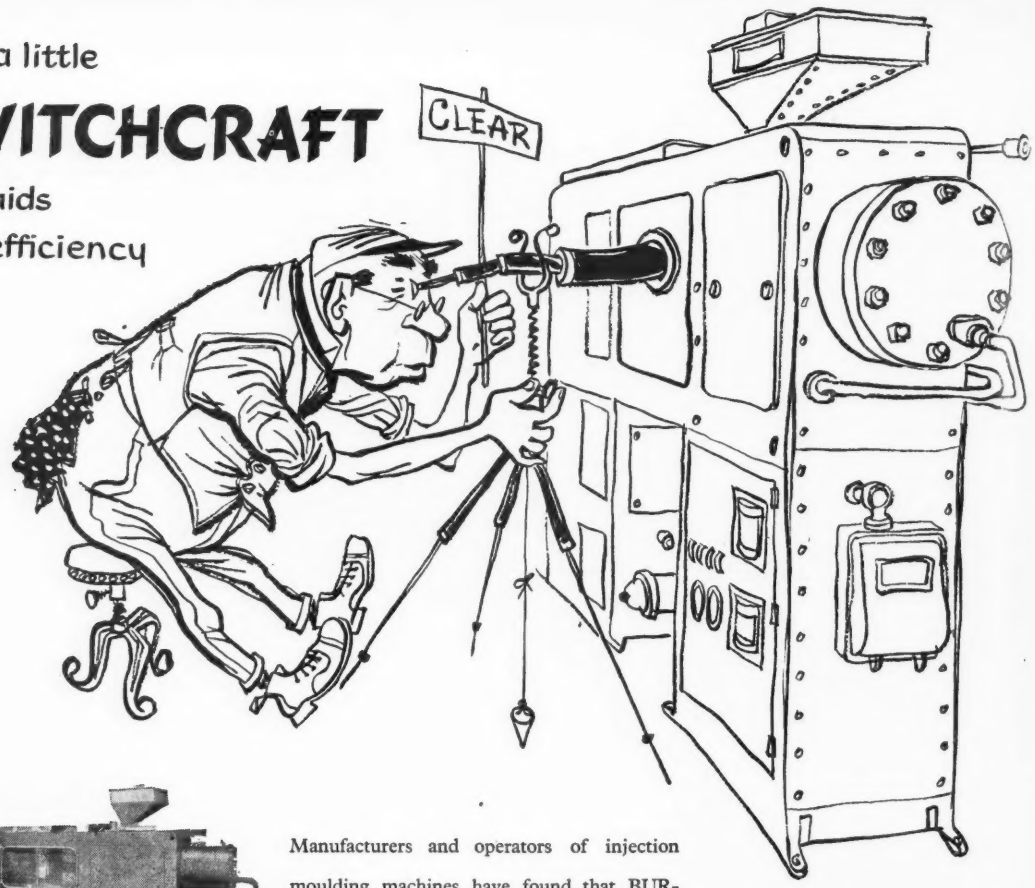
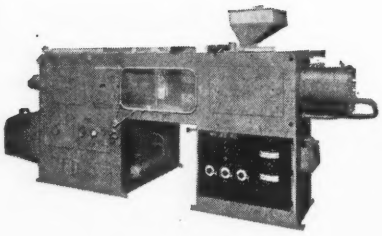
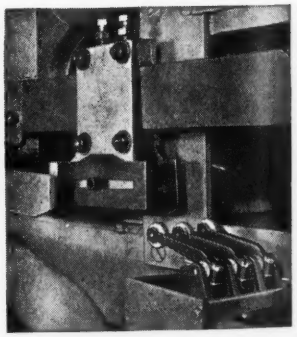




Manufacturers and operators of injection moulding machines have found that BURGESS MICRO-SWITCHES solve many problems; in doing so they provide infallible accuracy where "the human element" could make costly mistakes. The 'Peco' Model M40 8/12 oz. Injection Moulding Machine illustrated, for example, uses eight BURGESS MICRO-SWITCHES—four type Mk. 3BR-MS and four type Mk. 3BR-MS/A—which start and control the moulding cycle and operate safety devices. The three type Mk. 3BR-MS/A MICRO-SWITCHES seen in the detail illustration on the right are actuated by cams and control a sequence of operations. Another BURGESS MICRO-SWITCH provides sensitive protection to the tools by preventing the application of high pressure after the platen has closed under low pressure should there be any foreign matter—even something so small as a piece of paper—between the die faces.



The type Mk. 3BR-MS/A BURGESS MICRO-SWITCH is provided with a die-cast zinc alloy housing with a drop forged steel actuating arm and case hardened steel roller. The type Mk. 3BR-MS switch has a similar housing, but no actuating arm. For further details of these models and many more, please consult CATALOGUE No. 50/C.

Photographs above and left by courtesy of the Projectile & Engineering Co. Ltd.

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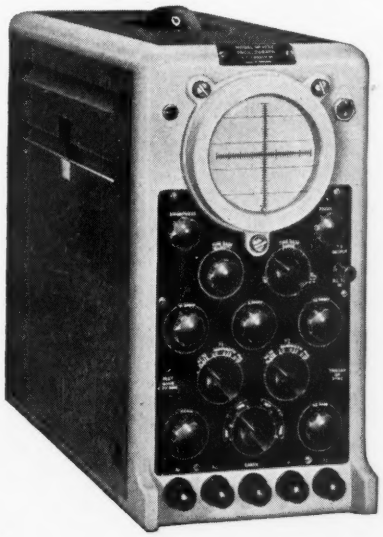
COSSOR presents Model 1052 double beam oscillograph



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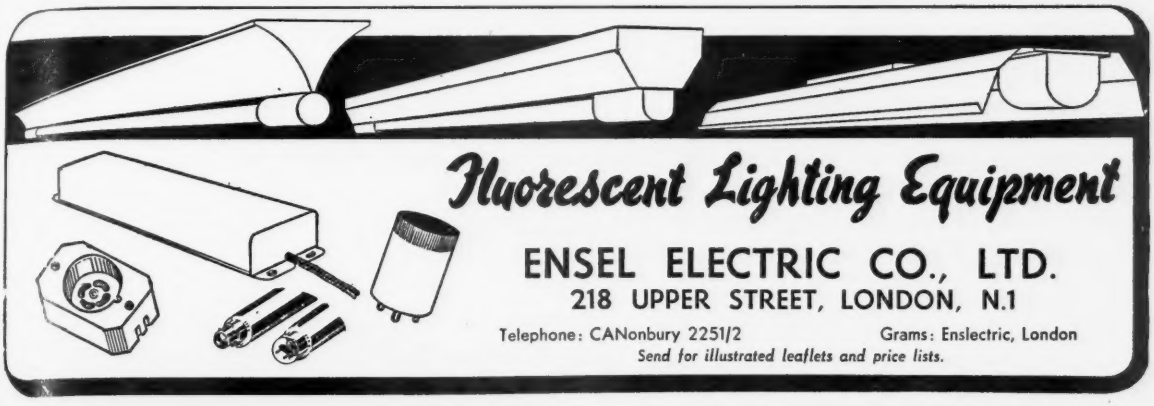

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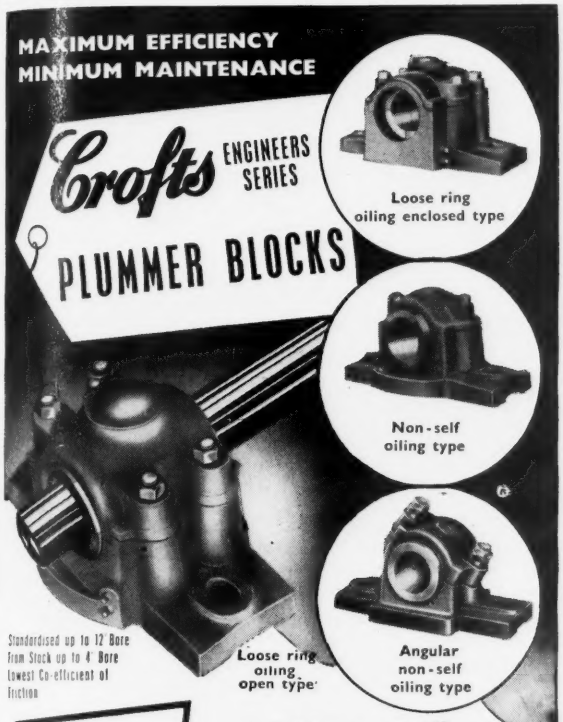

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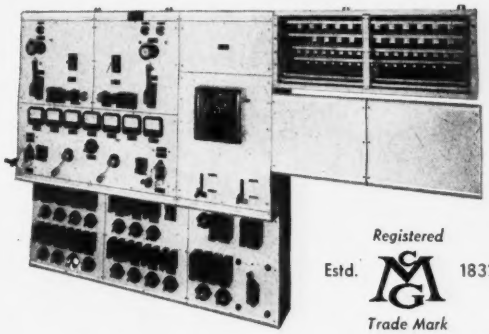

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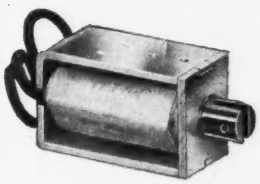

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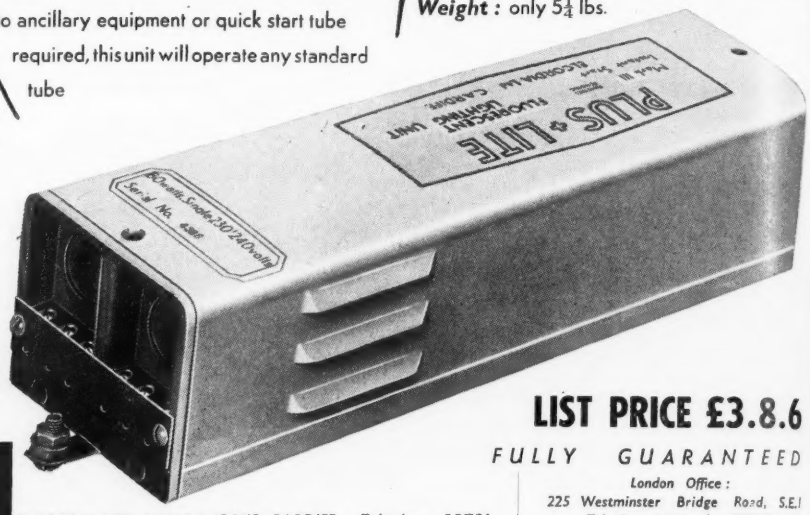

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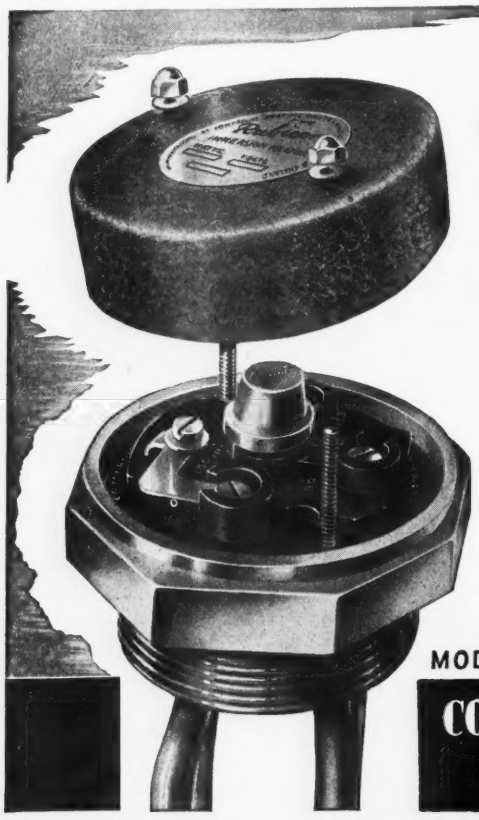

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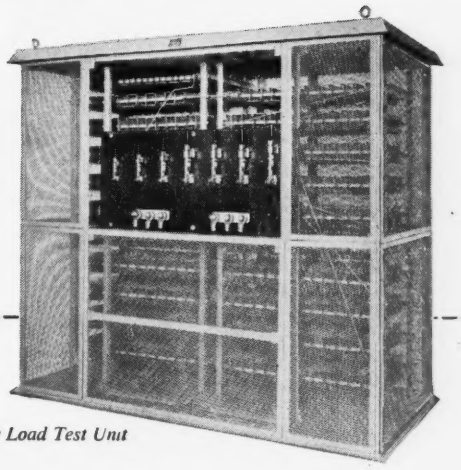
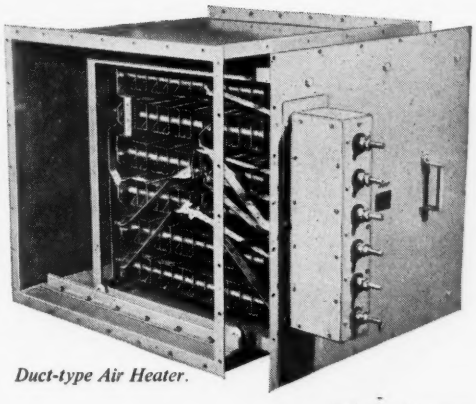


Generator Load Test Unit



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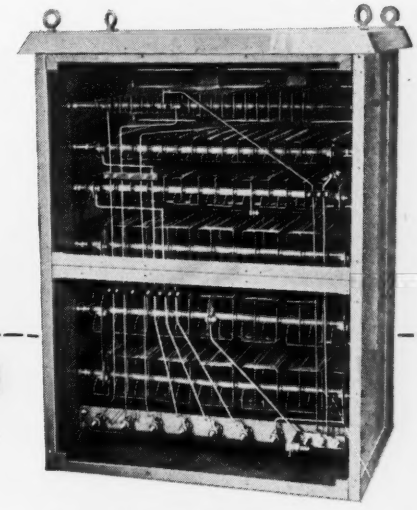
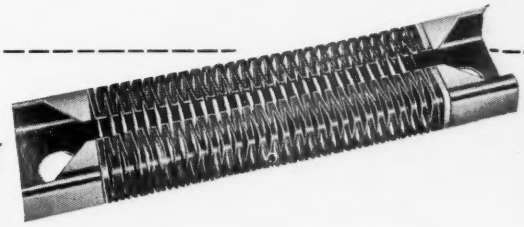


Industrial Starting Resistor



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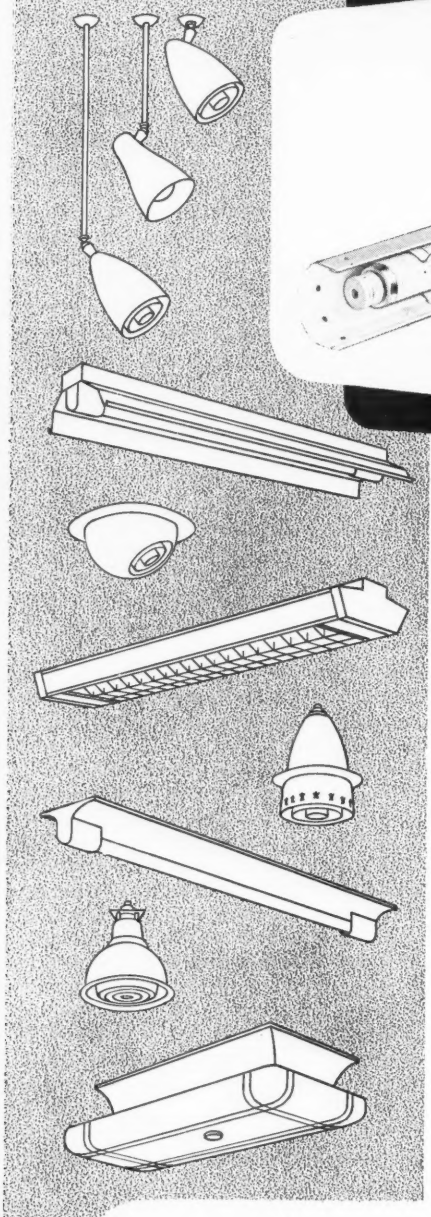

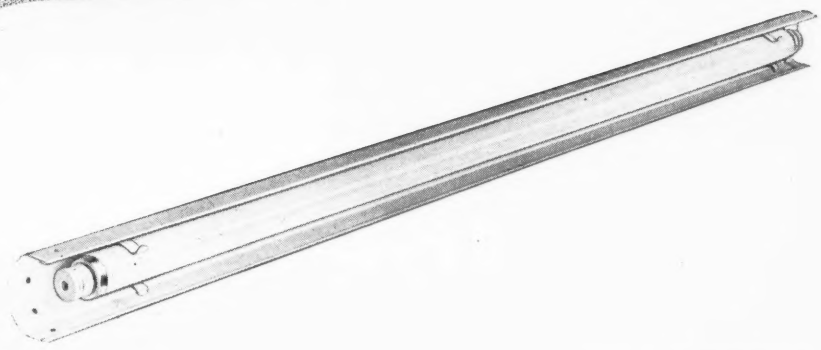

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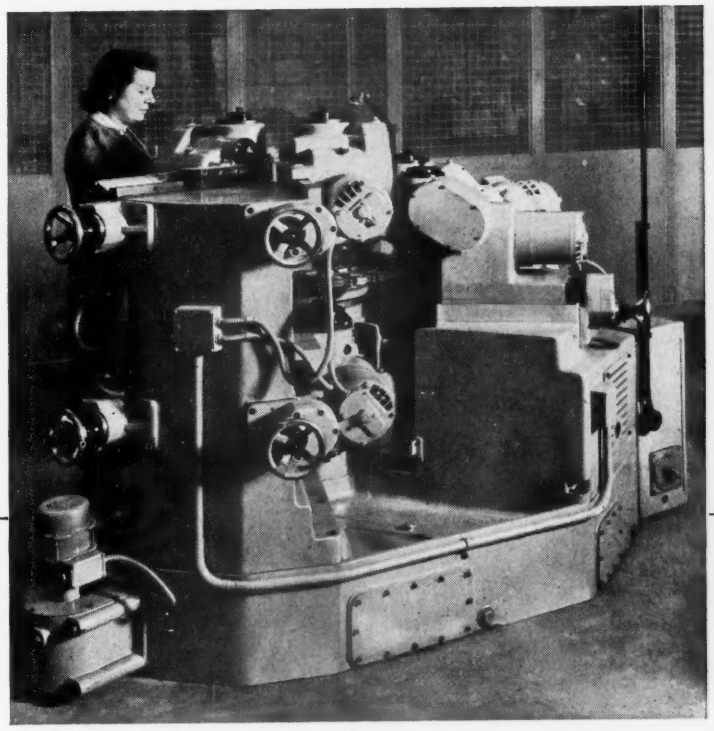
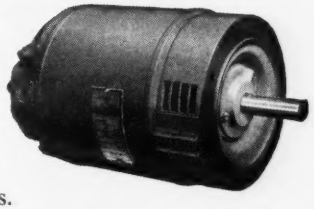
Fractional horsepower motor applications



There is a suitable 'ENGLISH ELECTRIC' motor for every industry where a fractional drive is required.



For instance, the illustration shows 'ENGLISH ELECTRIC' standard, flange-mounted motors driving a special Milling Machine.

Standard ranges include motors for single and 3-phase A.C., with split-phase or capacitor start; and D.C. types.

The versatility and adaptability of 'ENGLISH ELECTRIC' fractional horse-power motors are still further increased by alternative mountings and optional extra equipment.

'ENGLISH ELECTRIC'

f.h.p. electric motors

See also our Switchgear advertisement in this issue

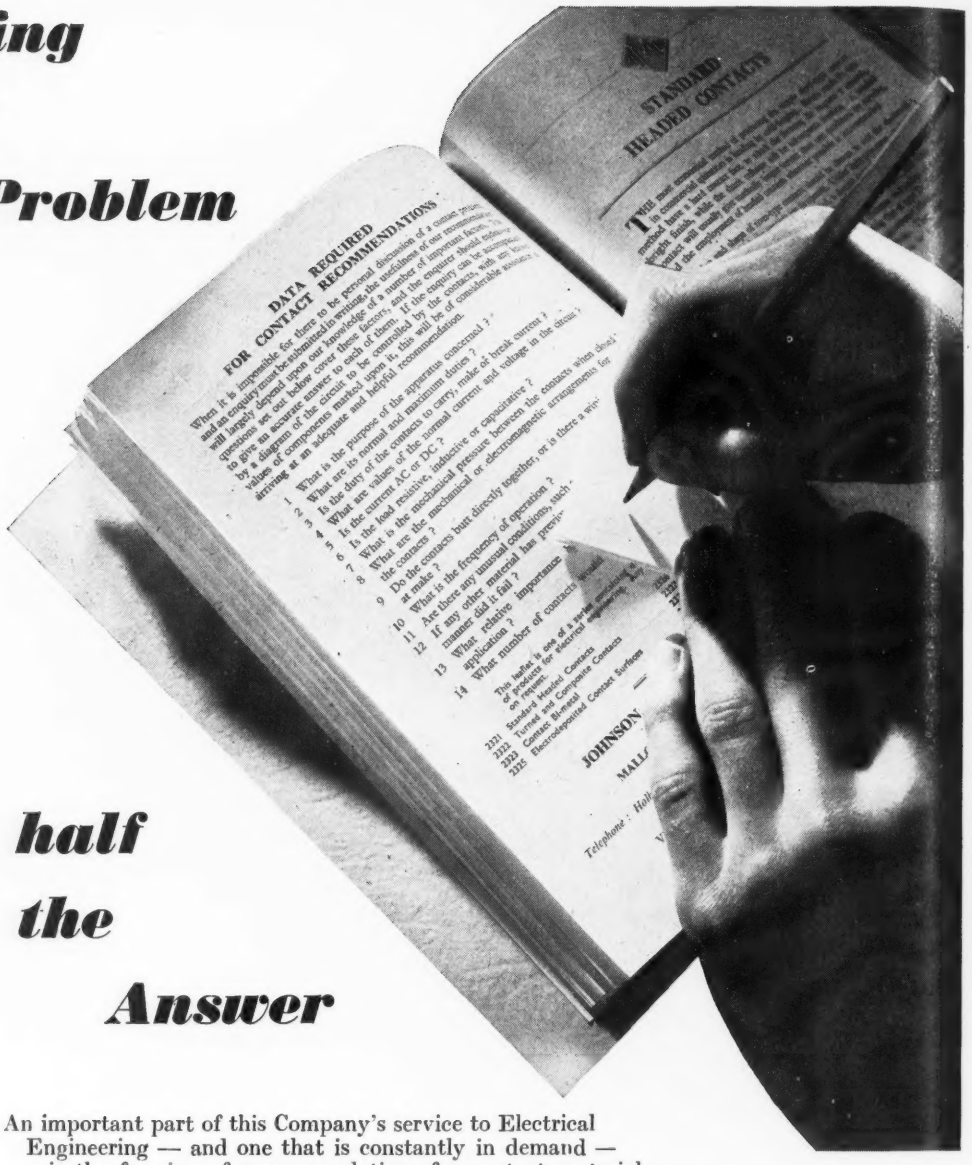
THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

F.H.P. Motors Department, Bradford

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

FHP.14AC4

Knowing the Problem



. . . is half the Answer

An important part of this Company's service to Electrical Engineering — and one that is constantly in demand — is the framing of recommendations for contact material and design.

But our long experience in this field can be used to full advantage only if the problem is clearly defined. Data Sheet 2320*, free on request, contains a short questionnaire covering the most important factors affecting contact performance.

Let us have the answers . . . . . and we'll answer *your* problem.

Johnson Matthey
MALLORY

* *One of a series of JMC technical publications dealing with electrical contacts. May we post you the complete set?*

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S.2.

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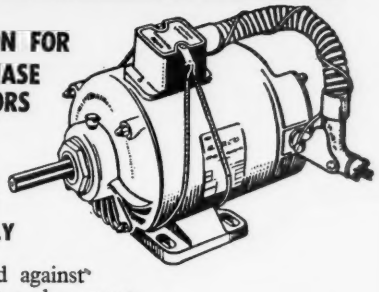
⅛-1 H.P. CAPACITOR AND SPLIT PHASE ONLY



Otters guard against temperature and current overload, the starting current is carried by the thin Otter Bi-metal, which heats up more quickly than the motor windings. It cannot be fused.

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Affords similar protection to the Auto, but upon "breaking" circuit will remain "off" until reset by pressing the Green knob. **List 31/7d.**

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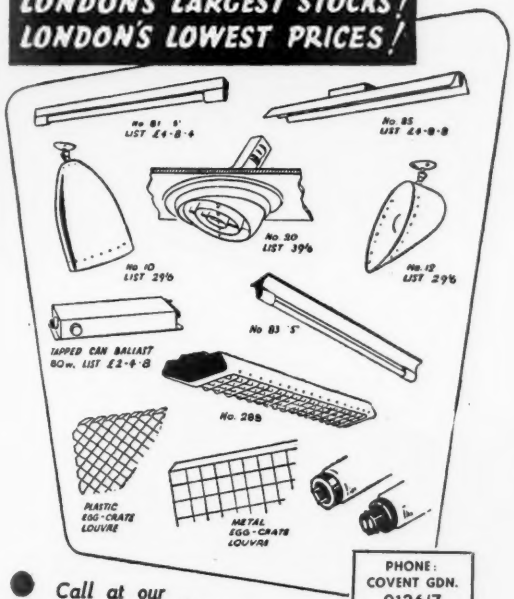

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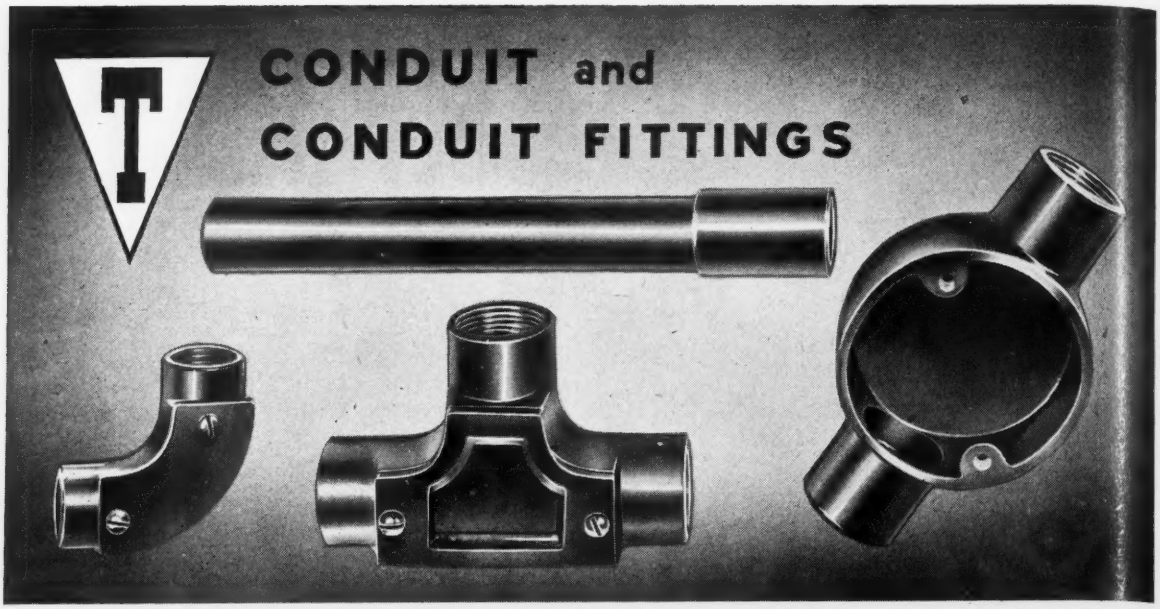

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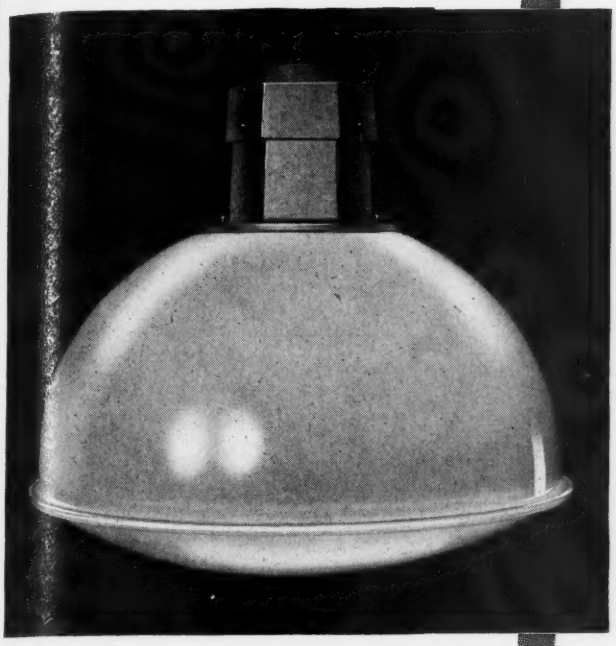

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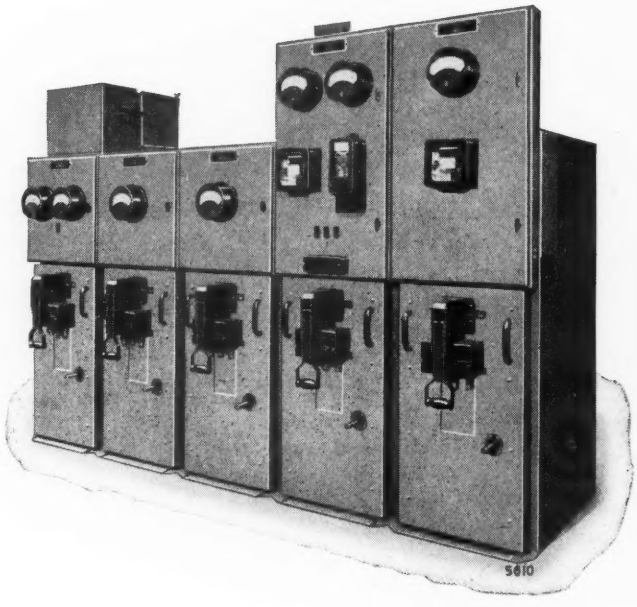

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3

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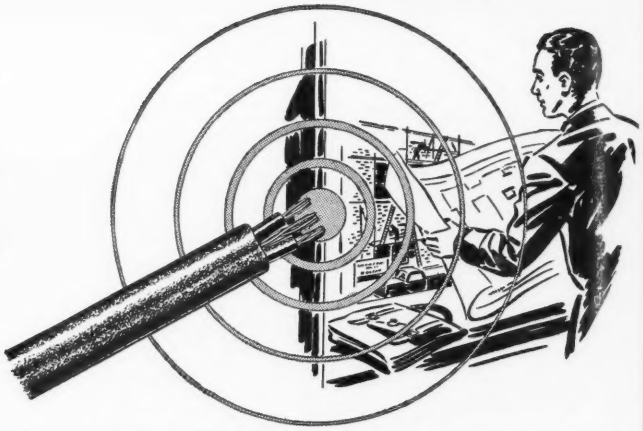

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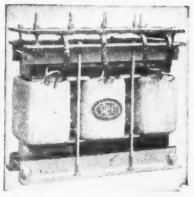

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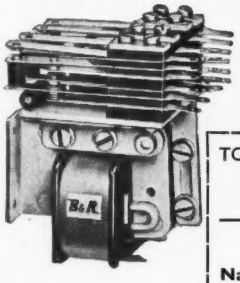

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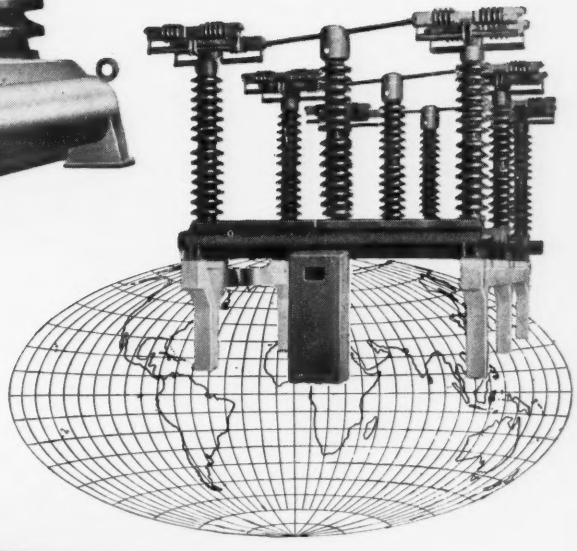

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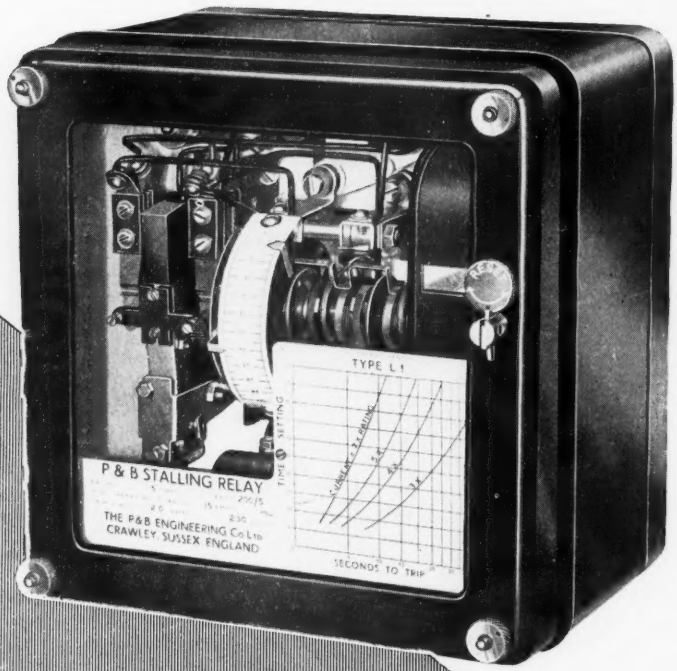

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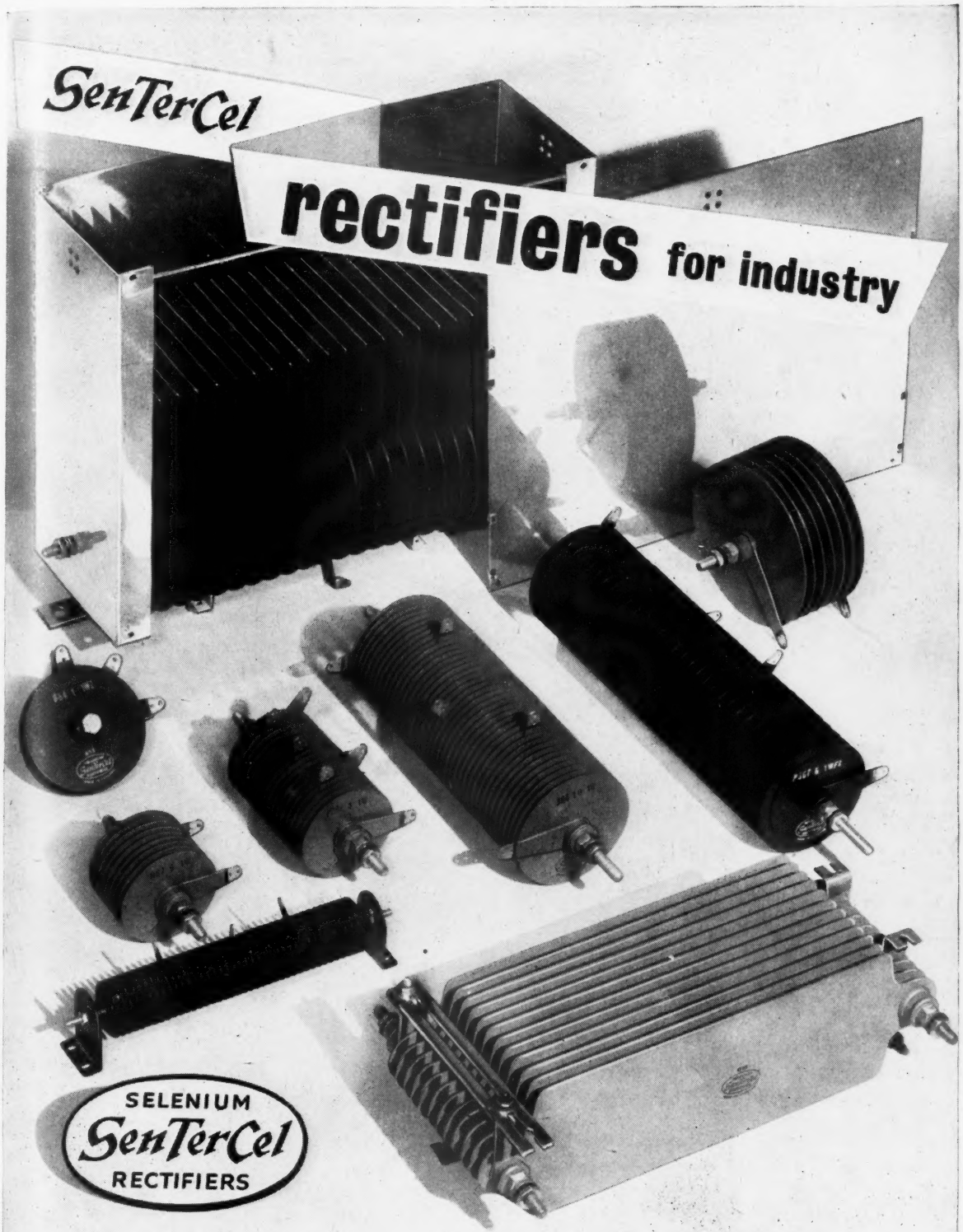

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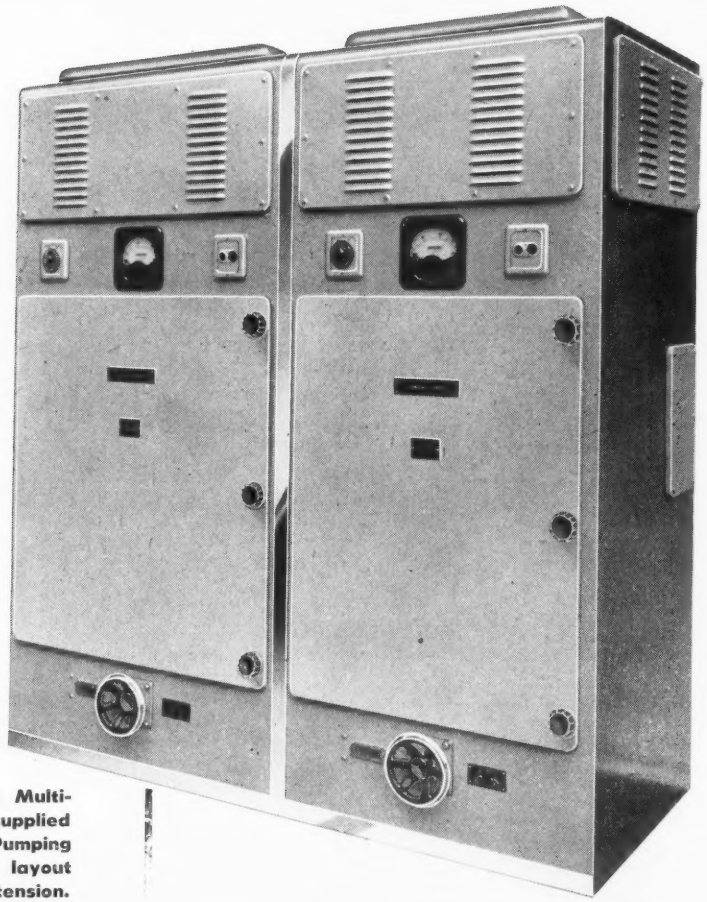

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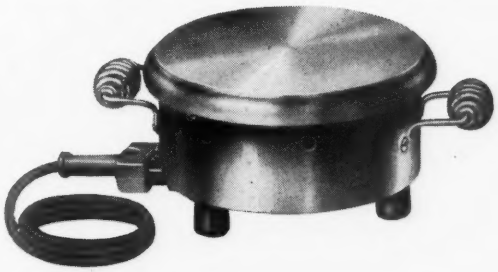

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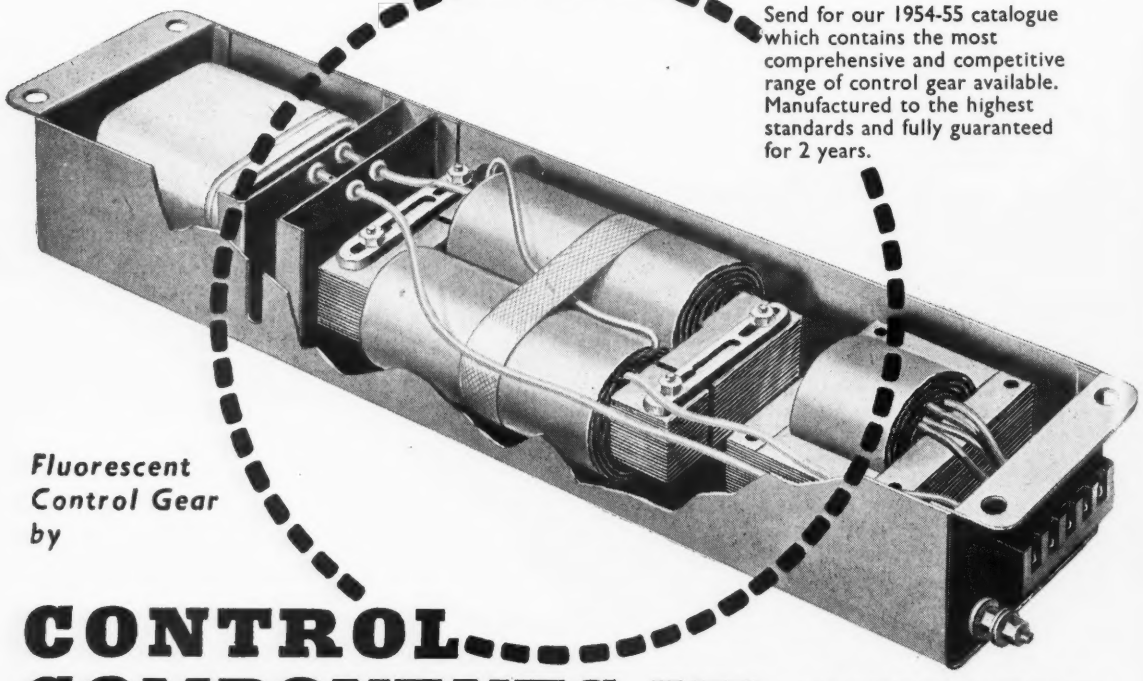

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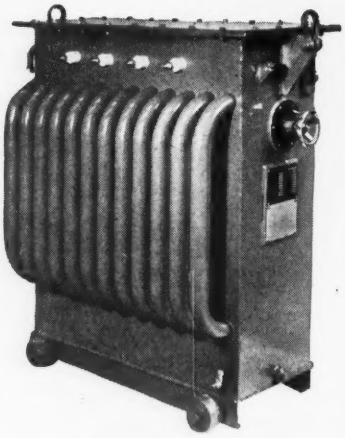

75 kVA, 400/200-600 V, 3 phase testing Transformer with off load tapping switch

S.T.L. Transformers are widely used in industry where reliable units are required for continuous duty

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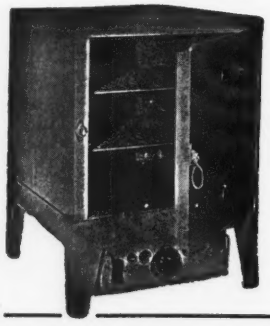

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For Mines, Marine, Factory, House Wiring, etc.

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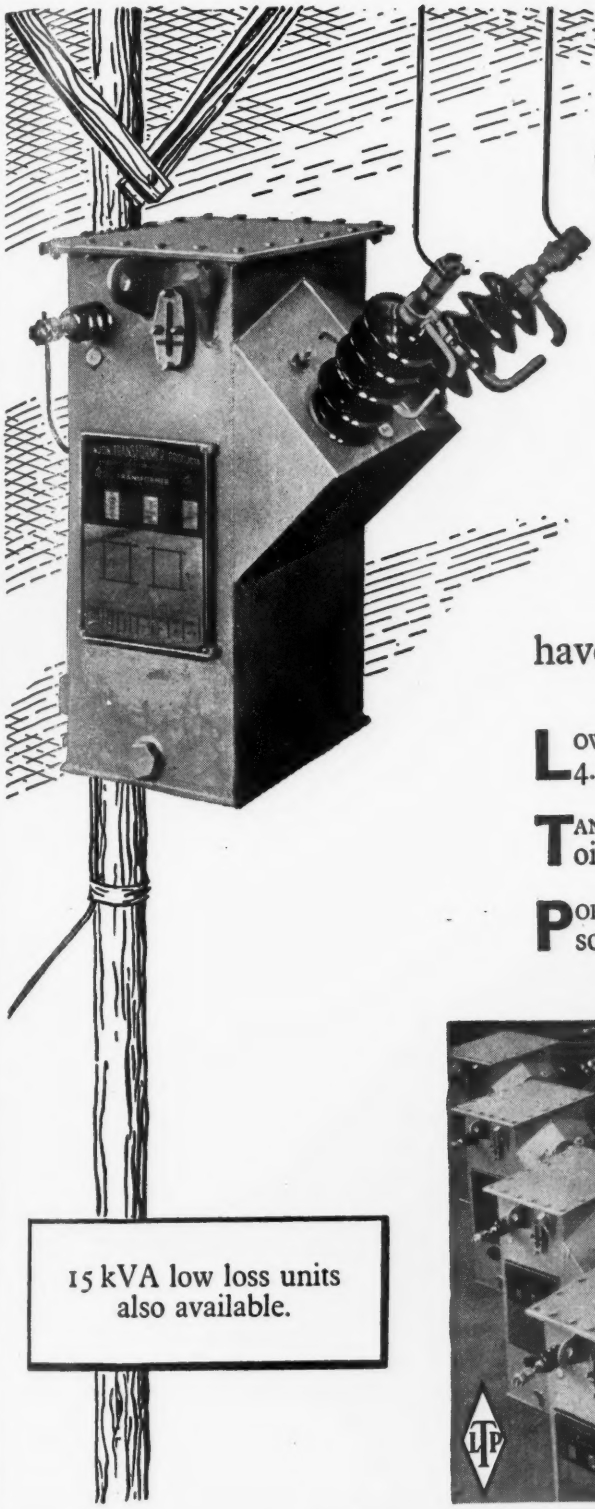

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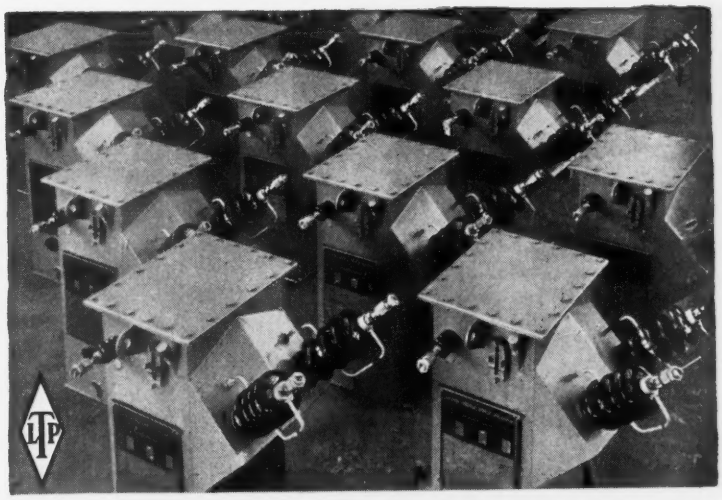
LOW LOSSES and high overload capacities; 4.5 kVA normal rating; ratio 11,000/250V.

TANKS have single bolt fixing, domed cover, oil gauge and thermometer pocket.

PORCELAIN BUSHINGS easily replaced on site; solderless connectors and H.V. arcing horns.

15 kVA low loss units also available.



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ELECTRICAL REVIEW

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12 NOVEMBER 1954

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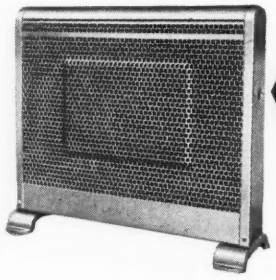

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ELECTRICAL REVIEW

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Oil Firing of Steam Stations

IN a debate which took place recently in the House of Commons Mr. Geoffrey Lloyd, Minister of Fuel and Power, said the Government's policy was to get more coal, to use it better, to supplement it with atomic energy as soon as possible, and to use oil at once, and natural gas if it could be found. The use of oil was expanding, and this year another two million tons of oil would be used, the equivalent of three million tons of coal. The new Marchwood power station, Southampton, would burn oil which could be supplied there at the same price as coal, and the British Electricity Authority was considering the installation of oil-firing equipment in other stations which would eventually be consuming 10 million tons of coal based on existing plans.

As a first step seven new stations would be so equipped, and he had been assured that two to three million tons of suitable oil would be available on a coal parity basis. The Marchwood station would begin to burn oil in the autumn next year and the others in the autumn of 1956. This was good progress in a short time. The oil used in these stations would be the equivalent of about five million tons of coal a year.

We understand that the British Electricity Authority has under consideration, subject to its being able to buy oil at a favourable price, equipping the following power stations for dual (oil and coal) firing: Marchwood (360 MW ultimate generating plant installed capacity); Barking " C " (150 MW); Poole (200 MW); Plymouth " B " (94·5 MW); Portishead " B " (300 MW); Carmarthen Bay (345 MW); and Tilbury " A " (360 MW). Marchwood, Tilbury " A " and Portishead " B " are stations under construction, and Poole, Plymouth " B " and Carmarthen Bay are already in operation with coal firing. With Bankside " B " and Barking " C," then, the B.E.A. is likely to have a total of nearly 2,000 MW installed capacity of steam operated generating plant with dual firing systems.

In the 1953–54 annual report of the B.E.A. it was pointed out that the establishment of new oil refineries in Great Britain had raised the possibility that the use of heavy fuel oil for the generation of power might become an economic alternative to the use of coal, in certain favourable circumstances; i.e., if the delivered price of oil was appreciably lower than the delivered price of coal of equivalent heat value, and if oil supplies could be assured for a period sufficiently long for the capital costs to be amortized. This seems to line up with the fact that all the stations named as likely to be converted are on or near the estuaries around our coast; for instance, it appears that the reason for employing oil firing at Marchwood is its close proximity to the new Fawley oil refinery.

There is little point in making thermal efficiency comparisons where the fuel prices are not on a comparable basis, but it is interesting to note in passing that one of the stations likely to be converted, Poole, is in the last B.E.A. selected list with a thermal efficiency of 28·11 per cent. The corresponding figure for Barking " C " station is 24·17 per cent, but in this case oil firing has been supplementary to pulverized fuel firing and for steam pressure raising only.

INSIDE KNOWLEDGE

Most of the evidence which is being presented to the Herbert Committee on the efficiency and organization of the electricity supply industry is coming from external sources—largely from local authorities and chambers of commerce. Much of this evidence may be ill-informed and possibly coloured by prejudice; there will be some lack of understanding of the industry's problems and facile solutions will be offered. Evidence of a different kind should result from the endeavour of the Electrical Power Engineers' Association to collect the views and observations of its branches in all parts of the country. The questions which are being asked cover such general matters as the separation of generation and distribution, the sub-area form of organization, and service to the consumer. Naturally the E.P.E.A. members' own conditions come into it. The branches are being asked whether the present system permits the ablest men to reach the highest positions and whether the exercise of initiative has been damped down by nationalization. Opinions on the efficiency of the B.E.A.'s education and training schemes are sought and the question of the value of the joint consultation system is raised. All these are important points upon which the technical men's views should be useful to the Committee.

END OF BUILDING LICENSING

In 1940 Defence Regulation 56A placed a limit on the amount which might be spent on building work, which included "work required for the purpose of providing water, light, heating or other services for a building" and thus covered the electrical installation and equipment. It was possible to obtain licences from the Ministry of Works for work costing more than the specified amounts but the procedure was troublesome and the refusal of licences often led to complications. At one time the financial limit in force was such as to make contracts of any size subject to licensing control; in 1944–45 it was as low as £10 in London and certain other districts in the Home Counties. Latterly there had been a considerable expansion and in January last the limits were raised to £25,000 for "designated" (i.e., agricultural and industrial buildings) and £1,000 for other work. But in recent months licences have been freely granted in all areas and so the control became merely nominal and it is not surprising that the Government has now decided to end it by revoking Regulation 56A.

CONTRACTORS' ENTERPRISE

We have always viewed with sympathy the electrical contractors' struggle for existence against the encroachments of the electricity supply authorities upon the installation field and where we could we have supported their case. At the same time we have recognized that the aim of the electrical industry, regarded as a whole, is to give the public adequate and satisfactory service. Electrical development in the past few years has been so rapid that work has gone to some electrical contractors almost without effort although we must acknowledge that others have taken a great share in the development. Expansion still proceeds and the contractors appear to be getting a goodly share of the work but the Electricity Boards are also increasing their contracting and "fittings" sales departments; the 1953–54 report of the British Electricity Authority showed an increase of over 20 per cent in the sales of these departments. It is apparent that to keep their end up the private contractors must actively seek business. As we have said before, they are probably better able to maintain a closer personal touch than the Boards and thus have one advantage. What has prompted these thoughts is a suggestion made at a recent meeting by the president of the Electrical Contractors' Association (Mr. A. F. Plummer), and reported in the *Electrical Contractor & Retailer*, that a sense of salesmanship was lacking in the industry. If that is really the case the sooner contractors develop this sense the better.

"ALL-IN" TENDERS

Mr. J. R. Beard in his presidential address at the British Electrical Power Convention last June made a reference to the practice which had been developed by some countries of making "all-in" bids for complete projects. These covered consulting services, manufacture and construction. He said it was widely felt in this country that such a system was not usually in the interests of the client and that the client-consultant-contractor relationship based on the normal practice of obtaining competitive tenders, with the assistance and guidance of a consulting engineer responsible for design, was likely to produce a better and cheaper job. But as the comprehensive offer had proved attractive to some overseas clients the Board of Trade had asked consulting engineers and contractors to consider some such arrangement. As a result of this the Association of Consulting Engineers and the Export Group for the Constructional Industries recently made an agreement whereby if a client desired it a comprehensive offer could be made for design, specification and construction, and, if mutually agreed, the supervision of works overseas. A subsequent statement has made it clear that the system is only to be employed at the client's express desire. The existing method of working between consulting engineers, clients and contractors is still held to be preferable.

TRACTION MOTORS

Although alternating current has long since replaced direct current as the accepted means of public distribution of electricity, the d.c. motor still retains its foothold for transport in its varied forms. In this field the three-phase motor, incomparable for most duties in industry, has not proved a success. The increasing number of battery vehicles in use naturally rely on d.c. More significant is it, as Mr. J. G. Bruce pointed out in his I.E.E. paper (reported elsewhere in this issue), that for diesel-electric locomotives d.c. has been chosen in all countries. Present indications are that questions raised by recent developments in the use of a.c. at 50 c/s for main line electrification will be resolved by the economic consideration, related to traffic density, of whether a.c./d.c. conversion should be carried out in rail-side substations or on the trains themselves.

Silicone Elastomers

Applications in the Electrical Industry

By R. L. BURNISTON, A.M.I.E.E.*

In the past silicone elastomers have been referred to as "silicone rubber," but although this material is similar in appearance and feel to natural rubber it does not contain any rubber or sulphur and therefore the use of the term "silicone rubber" is being discouraged in this country. The word "rubber" implies certain physical and electrical characteristics which are very different from those of the high and low temperature resisting "silicone elastomers."

Basically, this elastomer is an inorganic skeleton of alternate silicon and oxygen atoms. The addition of heat stable organic groups strongly bonded to each of the unoccupied valencies of the silicon atom contributes to the properties of high heat stability and inertness, which are the principal features of this silicone polymer.

When the polymer is compounded with one or more heat stable fillers (such as zinc oxide, iron oxide, titanium dioxide, calcium carbonate, alumina, diatomaceous earth, silica, fumed silica) and curing agents, it can assume the form of paste or putty. It is then suitable for dip coating, spreading, calendering, moulding, extruding, sheeting, and for filling compounds. The application of heat, preferably in an air circulating oven or steam autoclave, will initiate an oxidation-polymerization process, and produce a cured condition.

* H. D. Symons & Co., Ltd.

The physical properties of silicone elastomer can be varied by altering the type and proportion of filler and the curing conditions. Thus a compromise can be made between two or more properties or a particular one accentuated. These points should be remembered when using silicone elastomers for the first time and the most suitable grade should be chosen. Since their introduction into this country in 1945, when they had a very low tensile strength and tore easily, tougher materials have been developed which have stimulated the use of silicone elastomers.

Compared with natural rubbers, under normal atmospheric conditions, the silicone elastomers in current use have poor mechanical properties, but experience has indicated that these are adequate for most jobs, and that they maintain their properties outside the working temperature range of natural rubbers.

The major limitation to the widespread use of silicone elastomers is that of price. Products made from this elastomer are expensive when compared with their conventional counterparts, and are likely to remain so, because of the high cost of polymer production although, presumably, mass production will lower costs to some extent. Nevertheless, the superior characteristics of silicone elastomer in service offset the initial expense and can

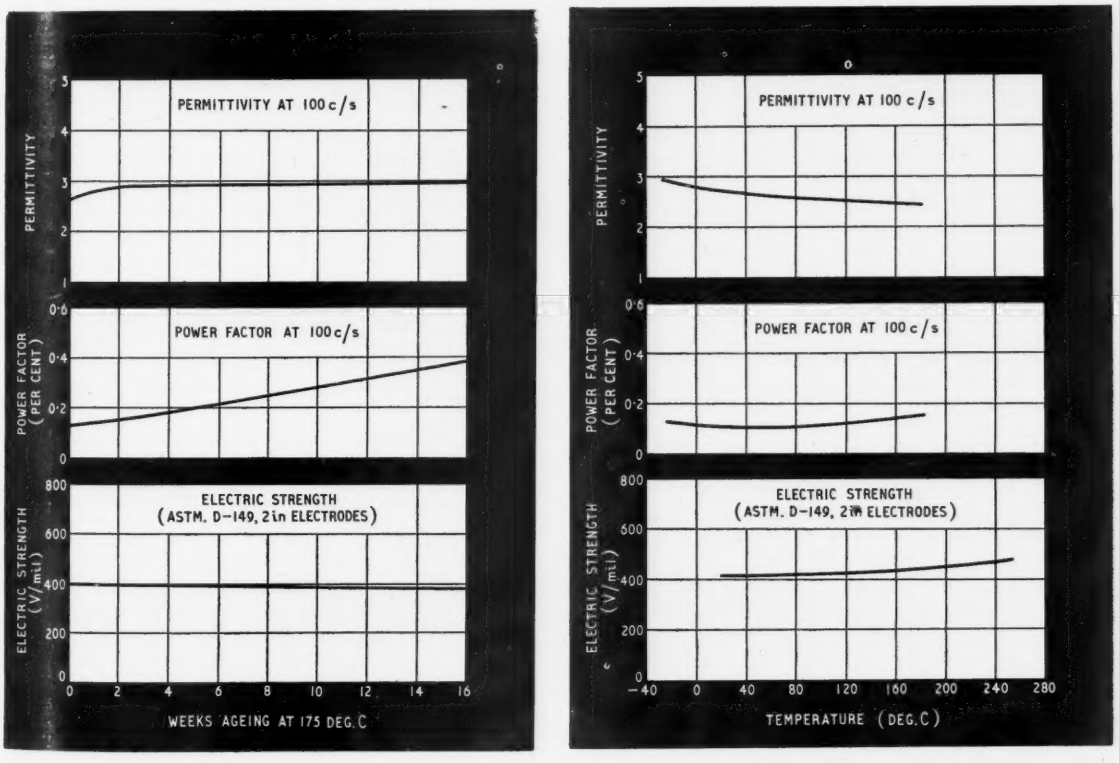


Fig. 1.—Variation of electrical characteristics with respect to time (a) and temperature (b) (Midland Silicones, Ltd.)

result in an overall saving in cost due to longer life or increased production, and reduced maintenance charges.

Because many grades of elastomer are available from various formulations it is beyond the scope of this article to deal with properties of all grades in detail, and therefore the following are generalizations. The operating temperature range is from −60 to +180 deg C. In this range there is freedom from cracking and crazing, and the electric strength, power factor, and permittivity remain substantially constant. Likewise prolonged heat ageing at 175 deg C produces little variation in these properties[1] (Fig. 1).

The electric strength is about half of that usually possessed by varnished glass fabrics of comparable thickness, but the reasonably flat time-voltage characteristic[1] of silicone elastomer is an advantageous feature. If electrical breakdown occurs the silica track is conveniently non-conducting and no carbonaceous path can be formed. Because of the highly water-repellant surface of silicones the volume and surface resistivity is high in humid conditions. The water absorption value is low and insulation resistance values of the order of 10^3 megohms[2] have been obtained on silicone elastomer insulated coils after 10 days' immersion in salt water. Ultra-violet light and fungus have no perceptible effect upon silicone elastomer and its resistance to oxidation, weathering, arcing, ozone, and corona,[1, 3, 5] is reported to be excellent. This elastomer, although heat resistant, will burn, but no worse than some other insulating materials such as untreated and varnished organic fabrics and papers, resins, polythene, and natural rubber. The thermal conductivity is fairly good and about that of varnished fabrics.

The chemical resistance of these elastomers varies and is partly dependent upon the type of filler employed, silica giving the best resistance. Similarly, some resistance to attack by solvents is achieved by using a high proportion of filler. Aromatic and hydrocarbon solvents cause considerable swelling of silicone elastomers, but if the solvent is able to evaporate the material will return to its original dimensions without apparent detriment.

In common with natural and many synthetic rubbers, silicone elastomers are swelled by oils, but the degree of swell depends upon the grade of elastomer and on the type of oil. Transformer oils cause up to 50 per cent volume increase, but animal, vegetable and heavy lubricating oils have little adverse effect. When silicone elastomers are used in those oils against which they are reasonably resistant, they can operate longer at high temperatures than natural rubber under comparable conditions. Steam above approximately 50 lb/sq in pressure will cause permanent deterioration of silicone elastomers and care should be taken when they are being employed in or near steam installations. The tensile strength is only about one-quarter of that of a compounded natural rubber tyre grade and the tear strength and abrasion resistance also are inferior to those of natural and polychloroprene synthetic rubbers.

Table 1. Range of Properties of Silicone Elastomers

Specific gravity	1·1 to 2·2.
Hardness B.S. degrees (*a*)	35 to 90
Tension strength lb/sq in (*b*)	400 to 900
Ultimate elongation per cent (*b*)	60 to 500
Compression set at 150 deg C per cent (*c*) ...	50 to 80 most grades. 10 to 30 special grades.
Brittle point, maximum (*d*)	− 57 deg C all grades. − 79 deg C special grades.
Electric strength, volts/mil (*e*)	Up to 700 V/mil.
Permittivity at 10^2 c/s (*f*)	As low as 2·9
at 10^6 c/s	ditto
Power factor at 10^2 c/s (*f*)	As low as 0·0015
at 10^6 c/s	ditto
Specific resistance at 20 deg C	Up to 10^{15} ohms/cm³
Thermal conductivity cal/cm/deg C/sec	$0·4$ to $0·67 \times 10^{-3}$
Specific heat cal/gm/deg C	0·3 approx.
Tear strength lb/in (*g*)	50 to 100
Abrasion resistance Dupont cc/hr (*h*)	0·6 to 16·0
Water absorption, per cent (*i*)	0·1 to 1 per cent

See appendix for details of test methods.

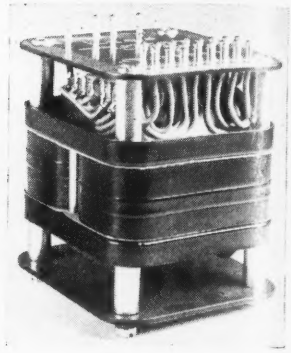


Fig. 2.—Audio transformer lead out wires insulated with "Symel" silicone elastomer sleeving (Partridge Transformers, Ltd.)

Sticky materials do not readily adhere to the surface of silicone elastomers and this property can be useful for release purposes in production processes. On the other hand, it may be a disadvantage when impregnating varnishes are used in conjunction with silicone elastomer sleeving on coil lead out wiring, since in such cases it is usually important for the sealing varnish to key perfectly to the lead out insulation.

It is probable that because of the inherent inertness and high heat stability of cured silicone elastomer, products made from it will have an indefinite shelf life under normal storage conditions. A summary of physical properties with the range of values obtainable from different formulations of silicone elastomer is given in Table 1.

Products and Uses

The four principal methods of processing silicone elastomer for electrical purposes are sheeting, moulding, extruding, and fabric coating. Elastomer sponge can be produced, and silicone elastomer can be bonded to itself and to metals by the aid of special silicone primers. In the form of pastes and putties it is useful as a sealing compound, around lead out wires and coil end cheeks. As unsupported sheet it may find a use for packing pieces and coil supports. It has been used successfully in sheet form with an embedded resistance wire as a heating blanket for curing out resin adhesives employed in lamination work.

The majority of conventional moulded rubber components can be reproduced in silicone elastomers, and numerous items have been made including micro-switch sealing cowls, sparking plug boots, protective shrouds for switchgear, push button switch covers, terminal caps, sealing bellows and O-ring seals.

Connecting wires and flexible cables can be insulated with an extruded sheath of silicone elastomer and these are being used for special situations in telecommunication equipment and aircraft. Extruded sleeving with a bore as fine as 0·5 mm is useful in certain instruments and miniature electronic apparatus. The applications of other silicone elastomer sleevings include lead out insulations from transformers (Fig. 2), chokes, coils, rotating machines, heating elements, and for electronic component connections. Other shapes are extrudable, such as solid circular, rectangular, channel and tadpole sections, and are mainly used for gaskets and seals.

Silicone elastomers can be coated on to woven fabrics such as asbestos, glass and "Terylene."* Coated asbestos is often used in the fabrication of ducting, hoses and

*"Terylene" is a registered trade mark of I.C.I., Ltd., for a particular polyester fibre.

gaskets for the aircraft industry. Coated glass fabrics can also be used for similar jobs and for the jacketing and sealing of traction motor coils. A more recent development is coated " Terylene " fabric for use at 150 deg C and in situations where greater flexibility and better abrasion resistance is wanted than coated glass fabric can provide.

In the form of sheets and mouldings which are often used as a finished product, the practical handling is reasonably straightforward. It is therefore the intention here to enlarge only upon two forms about which more working knowledge is desirable if silicone elastomer insulation is to be exploited fully and effectively. The expanding use in this country of silicone elastomer sleeving and coated fabrics suggests that for electrical insulation these forms of silicone elastomer may become the most widespread.

It is possible to pigment certain grades of silicone elastomer, and sleevings and tubings can be produced in at least eleven colours. When suitable pigments are used the colours will remain unaffected at temperatures up to 250 deg C. A recently developed grade of elastomer, of good tensile and electric strength, enables translucent sleeving to be produced. This is becoming popular as a protective sleeve for electrical components. Sleeving up to 5 mm bore can be made to the dimensional tolerances permitted on p.v.c. sleeving. When sleeving is used on single core conductors and in situations where abnormal external surface pressures may be encountered, a wall thickness greater than 0·5 mm is advisable if the possibility of mechanical damage is to be avoided.

Because of the high flexibility and elasticity of the elastomer grades used for electrical sleeving, some difficulty may be experienced when threading sleeving over long or flexible conductors. Generally, a bore slightly larger than the conductor will be required if the covering is to be carried out by hand in the normal way, but the nominal size sleeving can be fitted snugly without damage by the use of compressed air. This method has assisted one organization in the experimental use of sleeving for re-insulating the stator coils of a heteropolar h.f. generator (see Fig. 3).

In the United States there is available silicone elastomer sleeving internally reinforced with a glass braid for applications requiring greater mechanical strength and rigidity, since the high flexibility of pure elastomer sleeving may in some circumstances be a hindrance to production. Conversely, this high flexibility feature has been the main reason for using silicone elastomer on some jobs, the high temperature characteristics being disregarded. When this type of sleeving insulates lead out wires from impregnated or potted coils it is not prone to fracture or fatigue at the point of emergence since silicone elastomer is unaffected by the temperatures normally used in varnish and resin curing. Since the heat of soldering operations does not affect silicone elastomer insulation on conductors and cables, this becomes a practical time-saving property as far as mass production assembly processes are concerned.

In the field of electrical insulating sleevings the extruded silicone elastomer sleeving compares favourably with the best from the point of view of electrical characteristics.

Table 2. Typical values obtained on " Symel " silicone elastomer sleeving at various temperatures in air. Tests made on 1 mm I.D. × 0·4 mm wall sleeving

Temperature deg C	Electric strength minute breakdown value at 50 c/s (volts/mil)	Power factor at 800 c/s	Permittivity at 800 c/s	Specific resistance ohms/cm³
20	415	0·004	3·2	$4·2 \times 10^{15}$
130	535	0·019	2·8	$2·6 \times 10^{13}$
180	580	0·058	2·9	$5·2 \times 10^{12}$
200	610	0·070	2·9	$3·0 \times 10^{12}$

For example, " Symel " elastomer sleeving of 0·5 mm bore and 0·1 mm wall thickness has a minute breakdown value of 1 kV, and an instantaneous breakdown value of 3 kV when tested in water. On the same quality sleeving having a 0·5 mm wall, the *minimum* electric strength observed from production quality control records was 400 V/mil instantaneous breakdown value. " Symel " sleeving with a 0·4 mm wall thickness has been granted type approval to the Inter-Services Radio Component Specification 313 (Issue 2) for Type 3 insulating sleeving. The electric stress proof test in this specification is 2·0 kV for 1 min after conditioning for 16 hours at 55 deg C —100 per cent relative humidity with a cyclic variation of ±1 deg C. After similar conditioning the same size sleeving had an insulation resistance value in excess of 20×10^6 megohms. Typical electrical properties of sleeving at various temperatures in air are given in Table 2.

Coated Glass Fabric

Silicone elastomer coated glass fabric will meet the conditions of 180 deg C maximum working temperature specified in the tentative temperature classification of electrical insulating materials known as " Class H."

It is possible to coat glass fabrics on one or both sides and to vary the state of cure of the elastomer by accurate temperature control during this processing. The ability to exist in a semi-cured state is a feature which makes the use of this type of insulating material attractive. Coated glass insulating tape in the semi-cured condition is

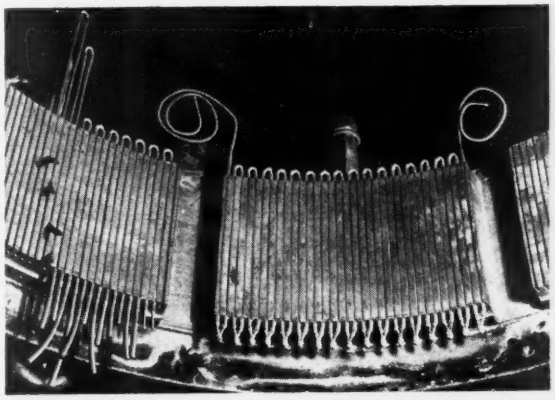


Fig. 3.—" Symel " silicone elastomer sleeving as stator coil insulation on a heteropolar h.f. generator (English Steel Corporation, Ltd.)

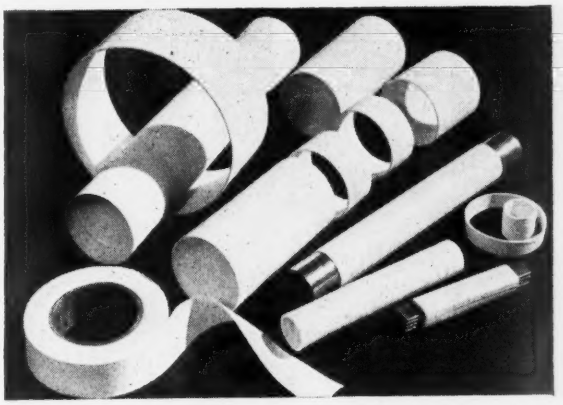


Fig. 4.—Semi-cured silicone elastomer coated glass tape with examples of its application on conductors and in the fabrication of tubes (H. D. Symons & Co., Ltd.)

pressure sensitive during application but will, after subjection to heat and pressure, cure out and simultaneously shrink. This causes those layers of tape in contact with one another to bond together (Fig. 4). Such a material is suitable for the fabrication of insulating jackets around electrical coils and conductors and in particular those incorporated in traction motors and other machines which operate under arduous conditions. After semi-cured silicone elastomer tape has been applied to a coil, pressure should be applied by means of presses, clamps, or a final wrapping of untreated glass tape to ensure that no voids are formed. However, when taping rectangular conductors it is advisable to avoid excessive pressure since this may reduce the elastomer thickness on the sharp edges.

The silicone elastomer will cure out and produce a bond after 15 min at 150 deg C. This curing should take place in a well ventilated air circulating oven. It should be noted that semi-cured material must not be heated up slowly from cold but placed into the appropriate curing heat immediately, otherwise the cure may be adversely affected. The bonded coated fabric is then cured at a higher temperature than that anticipated in practice; usually at 200 deg C or 250 deg C for several hours, dependent upon the grade of elastomer used. The semi-cured fabrics can also be laminated in a hot press and fully cured. These resilient sheets may be used for diaphragms, gaskets, and insulating packings (Fig. 5).

Silicone elastomer coated and impregnated fabrics in various cured conditions are made in this country in thicknesses from 0·003in and with different elastomer to base fabric ratios. The recently introduced impregnated thin glass fabrics in the bias cut form are a serious challenge to varnished glass fabrics. Typical properties of a 0·010in thick coated glass fabric are given in Table 3.

Semi-cured coated glass tape has been used by the Santa Fé Railroad Company in the U.S.A. for four years and it is reported[4] that traction motor field coils re-insulated with silicone elastomer fabricated jackets have had an operation time approximately equivalent to one million travelled miles without any apparent deterioration.

The conductors which originally were insulated with organic insulation and varnish had to be screened off from the subsequent silicone elastomer insulation lest the curing processes were inhibited. The general principle to be adopted in such cases is to remove as much organic material as possible and then dip the coil or conductor in a silicone varnish which should be allowed to air dry to a tacky finish. Any desired combination of silicone insulants can then be applied. The Santa Fé engineers have re-insulated their traction motor field and interpole coils with silicone varnish bonded mica-glass tape, 0·020in thick semi-cured silicone elastomer coated glass tape, woven glass tape, and silicone varnish.[4]

Traction Motor Insulation

In this country, the London Transport Executive, Railway Division, have carried out insulation development work with the silicones on Underground motors in order to establish a re-insulation application technique which exploits the main advantages of silicone insulation over conventional insulation for traction work. This task has achieved some success, and silicone insulated motors running with restricted ventilation, and thereby overloaded, are undergoing service trials on the Northern Line of the London Underground Railways.

One method adopted for trial utilized silicone bonded glass-mica tape and semi-cured silicone elastomer glass tape in conjunction with glass tape and silicone varnish.

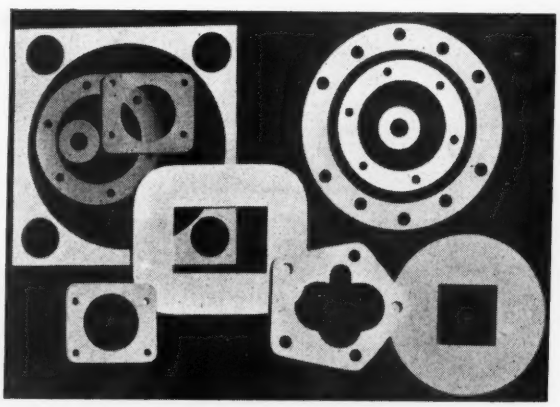


Fig. 5. — Silicone elastomer coated glass cloth laminates used for gaskets and washers (H. D. Symons & Co., Ltd.)

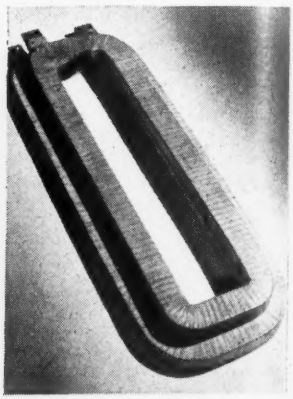


Fig. 7. — Underground railway motor main field coil insulated with mica, silicone varnish, and silicone elastomer coated glass tape (London Transport Executive)

Fig. 6 (below). — Underground railway motor armature bar insulated with mica, silicone varnish, and silicone elastomer coated glass tape (London Transport Executive)

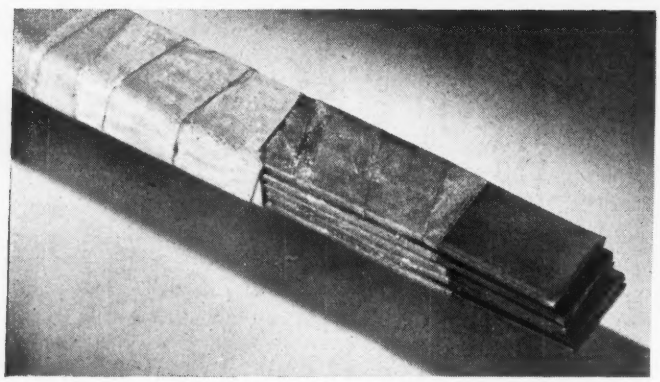


Table 3. Typical Properties of Silicone Elastomer Coated Glass Tape, Fully Cured—10 mils thick

Tensile strength/1in width	80 lb
Bursting strength (Mullen)	100 lb/sq in
Weight per square yard	12 oz
Electric strength at 20 deg C,* ¼in dia. electrodes, instantaneous breakdown value	900 V/mil
Electric strength at 20 deg C,* 1⅛in dia. electrodes, instantaneous breakdown value	700 V/mil
Power factor at 800 c/s, 3in dia. electrodes, at 20 deg C, 75 per cent relative humidity	0·016
Permittivity at 800 c/s, 3in dia. electrodes, at 20 deg C, 75 per cent relative humidity	4·6
Volume resistivity at 20 deg C, 75 per cent relative humidity	$1{\cdot}8 \times 10^{13}$ ohms cm

* At 90 deg C and 180 deg C these values are substantially the same.

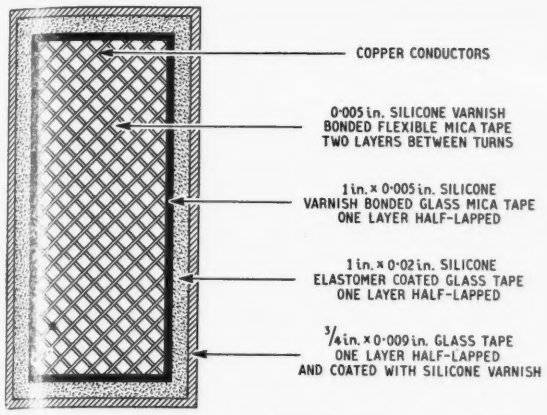

COPPER CONDUCTORS
0·005 in. SILICONE VARNISH BONDED FLEXIBLE MICA TAPE TWO LAYERS BETWEEN TURNS
1 in. × 0·005 in. SILICONE VARNISH BONDED GLASS MICA TAPE ONE LAYER HALF-LAPPED
1 in. × 0·02 in. SILICONE ELASTOMER COATED GLASS TAPE ONE LAYER HALF-LAPPED
3/4 in. × 0·009 in. GLASS TAPE ONE LAYER HALF-LAPPED AND COATED WITH SILICONE VARNISH

Fig. 8.—Schematic cross sectional view of the main field of a L.T.E. traction motor insulated with glass, mica, silicone varnish and silicone elastomer

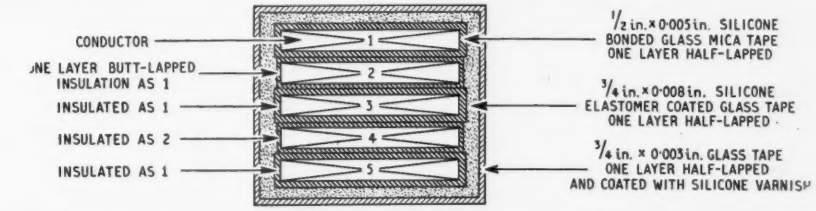

CONDUCTOR
ONE LAYER BUTT-LAPPED INSULATION AS 1
INSULATED AS 1
INSULATED AS 2
INSULATED AS 1
1
2
3
4
5
1/2 in. × 0·005 in. SILICONE BONDED GLASS MICA TAPE ONE LAYER HALF-LAPPED
3/4 in. × 0·008 in. SILICONE ELASTOMER COATED GLASS TAPE ONE LAYER HALF-LAPPED
3/4 in. × 0·003 in. GLASS TAPE ONE LAYER HALF-LAPPED AND COATED WITH SILICONE VARNISH

Fig. 9.—Schematic cross-sectional view of slot portion of L.T.E. traction motor armature bar insulated with glass mica, silicone varnish and silicone elastomer

This was applied to armature conductors as well as main field and interpole coils. Figs. 6 and 7 are photographs of an armature bar and field coil, and the application method is given in schematic form with more detail in Figs. 8, 9 and 10.

Because the curing temperature used was high, all coil terminals were riveted and brazed instead of soldered. Between most of the lappings of tape insulation silicone varnish was brushed on and allowed to air dry for an hour before it underwent any heat treatment. The silicone elastomer tapes were heated at 150 deg C for half an hour after application, and when the fabrication of the insulation was completed, a final cure of 200 deg C for six hours was given to cure out the varnish and elastomer in one operation. Immediately after this, whilst still hot, the armature bars and field coils were placed in a cold press.

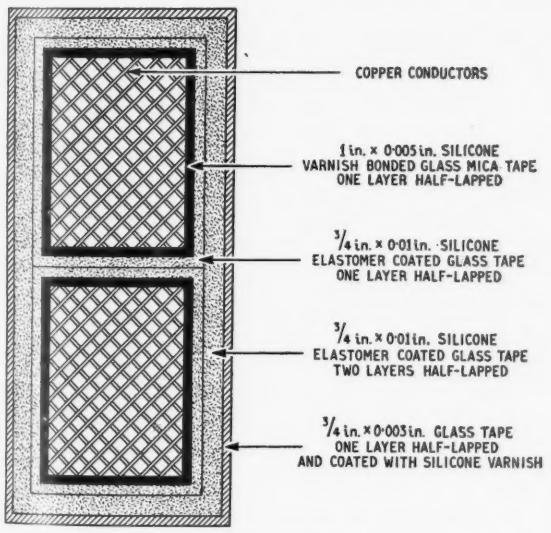

COPPER CONDUCTORS
1 in. × 0·005 in. SILICONE VARNISH BONDED GLASS MICA TAPE ONE LAYER HALF-LAPPED
3/4 in. × 0·01 in. SILICONE ELASTOMER COATED GLASS TAPE ONE LAYER HALF-LAPPED
3/4 in. × 0·01 in. SILICONE ELASTOMER COATED GLASS TAPE TWO LAYERS HALF-LAPPED
3/4 in. × 0·003 in. GLASS TAPE ONE LAYER HALF-LAPPED AND COATED WITH SILICONE VARNISH

Fig. 10.—Schematic cross sectional view of interpole field of a L.T.E. traction motor insulated with glass, mica, silicone varnish and silicone elastomer

Development work is in process in this country using silicone elastomer coated glass and "Terylene" fabrics and it is expected that their peculiar features will be used eventually in special versions of motors, transformers, heating plant and other equipment.

Despite its limitations and the fact that silicone elastomer can sometimes be advantageously used in normal temperature equipment, it is wise to remember that the main benefit that the material can offer is high and low temperature resistance coupled with a high degree of resilience and flexibility. Such a combination is unique.

Acknowledgment is due to Messrs. H. D. Symons & Co., Ltd., for permission to publish this article, to Midland Silicones, Ltd., for technical assistance and photographs, and to the chief mechanical engineer (railways), London Transport Executive, for permission to publish details of the silicone insulated traction motor.

APPENDIX—TEST METHODS

(*a*) Hardness—B.S. 903, Part 19: 1950—Thickness 0·250 ±0·010in.

(*b*) Tension Strength—B.S. 903, Part 15: 1950—Dumb-bell test piece, Type B.

(*c*) Compression Set—B.S. 903, Part 18: 1950—Constant deflection method at 150 deg C. Test pieces at Type 1, but consisting of two plies each of nominal ½in thickness. Compression set 60 min after releasing pressure—expressed as a percentage of the compression applied.

(*d*) Brittle Point—A.S.T.M. D7.46–44 T.

(*e*) Electric Strength—A.S.T.M. D149–44 continuous voltage rise—2in diameter electrodes, test piece of nominal ⅛in thickness.

(*f*) Permittivity Power Factor—B.S.903, Part 34: 1950.

(*g*) Tear Strength—B.S.903, Part 25: 1950.

(*h*) Abrasion Resistance—B.S.903, Part 24, 3, 1950.

(*i*) Water Absorption—A.S.T.M. D471–51T—increase in weight after 7 days' immersion at room temperature.

(*j*) Electric Strength in Water—A close fitting copper wire is inserted into the sleeving and then wrapped around a ½in mandrel. After removal from the mandrel, the specimen is immersed in water and tested between wire and water with 50 c/s a.c. supply.

REFERENCES

[1] "Silicone Rubber emerges as a Dielectric Material"—J. F. Dexter, *Electrical Manufacturing*, June, 1950, p. 100.

[2] "A New Resilient Class H Material for the Insulation of Traction Motor Field Coils"—J. Ross Reed and J. J. Tyner, *Transactions A.I.E.E.*, October, 1950, 69.

[3] "Corona Resistance of Silicone Rubber"—S. I. Reynolds, *Electrical Manufacturing*, February, 1954, p. 132.

[4] "Silicone Rubber Insulation for Traction Motor Frame Coils"—*Railway Locomotive and Cars*, December, 1953.

[5] "Silicone Rubber—A New Synthetic Elastomer"—Shailer L. Bass, *Proc. 2nd Rubber Tech. Conf.* (London), 1948, 17–32.

I.E.E. Christmas Lecture

THE Institution of Electrical Engineers has arranged a Christmas lecture for older schoolchildren to be given in the lecture theatre of the Institution, Savoy Place, W.C.2, at 3 p.m. on 30th December, and again, at the same time, on the following afternoon. The subject of the lecture, which will be illustrated with demonstrations, will be "Nuclear Power—Electricity from Uranium," and it will be delivered by Dr. T. E. Allibone, who directs the research activities of Associated Electrical Industries, Ltd.

Traction Motor Maintenance

IN a review of maintenance practice for d.c. 600 V traction motors, which he presented before the Institution of Electrical Engineers on 11th November, Mr. J. G. Bruce dealt with recent developments, mainly by London Transport, under the three heads of running-shed maintenance, periodic overhaul and repairs.

Maintenance nowadays he referred to as consisting principally of inspection of commutators and brush gear, brush changing, greasing and inspection of bearings and gears, and testing of insulation. Every armature roller bearing received 1¼ oz of grease yearly. All new motors were clamped to a white-metal suspension sleeve, which was concentric with the axle on a pair of roller bearings; oiling was done once a fortnight and repacking (and remetalling of suspension bearings) at 40,000 to 50,000 car miles. Wear was generally greatest at the flanged end and most marked where cast-iron blocks were used for braking. An advantage of the exclusive use of the fourth rail return lay in the avoidance of difficulties due to the passage of current through the bearings and eliminating current-diverting brush gear on the axle.

Commutator brushes were examined at four- to six-weekly intervals (depending on age) and carbon wear of ⅜ to 1in was usually allowed; on modern machines the brushes lasted at least 18 months. Equipment was taken out of service if the insulation resistance fell below 2 megohms, which was rare as regards motors.

Overhaul periods of vehicles and traction motors usually coincided. A gear wheel lasted twice as long as a pinion wheel (which had a life of over 500,000 miles) owing to its lower rotational speed; fatigue failures were found by a magnetic crack detector. Brushgear trouble arose from lack of rigidity, which caused breakdown of insulation of supports, and from wear on boxes or short brushes. Shot-blasting was an economical method of cleaning carbon and copper dust from holders.

Brush pressure on traction motors was higher than was general with stationary machines and should be about 5 lb/sq in. Roller bearings were cleaned by washing in paraffin or white spirit. Replacement of faulty examples had proved less expensive than building up races by nickel deposition. Bearing housings in the framehead damaged by defective roller bearings were rebored and fitted with liners as a simpler method than metal-spraying.

The banding of an armature should be removed if any doubt existed as to its soundness. The practice of London Transport was to stop all external crevices with putty, after which the whole armature was painted with insulating enamel and baked at 110 deg C without impregnation. For skimming a commutator a high-speed tool was usually found satisfactory, a cut of about 0·01in being enough after 200,000 miles' service. Before being turned the edges of each segment should be bevelled. Mica should be taken down by at least $\frac{3}{32}$in to allow for 300,000 miles of service and the slots cleaned with a hand tool.

Regarding repairs, the armature had been the part of a traction motor to give most trouble. Insulation breakdown generally occurred in its slots. The development of the evolute bar had removed the need for joints at the back end of the armature. Modern motors of London Transport had a wave winding with two layers of five bars in each slot, thus requiring only one pair of brush boxes.

Glass and silicone insulations now provided a better, if somewhat more expensive, alternative to Class B insulation, although the use of mica and the elimination of all carbon-producing media were still necessary for improving resistance to heat. Experimental coils insulated with silicone were now in service. Improvement of temperature characteristics through the use of silicone insulation suggested the elimination of fans and the total enclosure of the motor, but at present this would entail increasing its size.

As much bar-to-slot insulation as possible was required, even at the expense of insulation between conductors. The main insulation was in sheets consisting of a backing of rice paper to which mica flakes were attached by freshly made shellac varnish. Following the placing of the bars in the armature slots, an a.c. test at 2,500 V was applied for one minute. This test was repeated after the armature had been baked for 24 hours and received its final coat of insulating paint and was followed by a bar-to-bar test to ensure good joints.

Main and interpole field coils were wound on a start-and-stop slow-operation winder with flat copper strip and insulated between turns and layers. The completed coil was baked for two hours, soaked in insulating paint and further baked at 70 deg C for fourteen hours. A finishing wrap of asbestos tape was followed by a further two coats of grey paint.

High Steam Temperatures

AN account of two years' experience of the operation of s.s. *Nestor* and *Nelius*, each of 7,000 s.h.p., the first British ships to use steam at 950 deg F was given on 9th November by Messrs. L. Baker and W. H. Falconer (Alfred Holt & Co.) before the Institute of Marine Engineers. That temperature was chosen to permit the use of ferritic steels in the superheater and steam ranges and to avoid ferritic austenitic joints. To limit thermal effects and casing distortion when going astern 750 deg F was also required. A gain of 2½ per cent in fuel consumption was obtained by using an electrically driven feed pump with an automatically started steam stand-by.

Although the astern power was only 50 per cent of the ahead power, the handling of the vessel had stood up well to rapid changes from ahead to astern. Turbine clearances were about a quarter of those customary in marine practice. The use of molybdenum disulphide in vaseline as a lubricant for the bolts of the turbines and steam pipes had eliminated difficulty in dismantling for examination.

The by-pass dampers of the first zone of the superheater for one ship, which were coated with ceramic paint, gave no trouble from burning or distortion, as did those of the second ship, in which uncoated high grade heat resisting alloys were used.

The low-water alarm consisted of a microswitch which was tripped directly by the thermostatic elements of the feed-water regulator and energized a solenoid, cutting off the oil supply. For the high-water alarm a probe was charged with a.c., the boiler drum being earthed; the level of the water or foam on reaching the tip of the probe tripped a microswitch.

Coal-Burning Gas Turbine

AT a meeting of the Institution of Mechanical Engineers on 5th November, Professor D. L. Mordell (McGill University, Montreal) described tests on an experimental coal-burning gas turbine operated on the exhaust-heated cycle. In that cycle, he stated, the air delivered by the compressor passed through a heat exchanger before expansion in the turbine, the exhaust from which provided the combustion air in a coal-burning cyclone furnace. The products of combustion gave up their heat in the heat exchanger to the compressed air. The turbine blades thus came into contact with air only and combustion products touched only stationary and low-loaded members.

An obsolete aircraft turbine was derated to run at 13,600 r.p.m. instead of 14,500 r.p.m., the maximum temperature being lowered to 1,340 deg F from 1,520 deg F; the effect of this was to give a maximum of 800 h.p. on oil and 500 h.p. on coal. Particulars were given of the designs of the components and the test procedure, which started in November, 1953, and were believed to include the first runs of an exhaust-heated gas turbine on oil and coal.

Final conclusions regarding the possibilities of the cycle must await the results of protracted operation, but the tests so far had proved that coal could be used as fuel and that starting and load variations could be dealt with satisfactorily.

Reduction in Motor Sizes

Progress During the Last Fifty Years

By J. L. WITTRICK, M.I.E.E.*

SINCE 1929 electric motor manufacturers in America have been building motors to a horse-power frame relationship laid down by the National Electrical Manufacturers' Association (N.E.M.A.). The leading dimensions of these frames, i.e. centre rise height, shaft diameter and mounting dimensions have also been standardized throughout this period. This has no doubt been of tremendous advantage to the machine tool manufacturers and other large users of motors, but has prevented full advantage being taken of all the improvements in materials and designing technique gained during the past 25 years. In this country, however, where until recently no attempt at standardization had been made, new developments have been introduced gradually over a long period, with the result that most motors of British and Continental make for any given horse-power rating have for many years been smaller than their American counterparts.

The result has been that American motor manufacturers have been building motors in much larger frame sizes than is necessary or practical. The need for a revised and more realistic standard has now become necessary, to allow motor manufacturers to take full advantage of all the technological advancement, and to enable them to meet the increasing tempo of foreign competition.

Early in 1953 the Motor and Generator Section of N.E.M.A. decided to revise the frame assignment standards for a.c. motors up to and including 30 h.p. This revision allows a more economical and efficient use of materials, enabling a greater horse-power per frame size to be obtained. Recently the Canadian Electrical Manufacturers' Association announced that they also had decided to revise their standards for industrial a.c. motors, bringing them into line with those of the United States. It appears therefore that it will be necessary for British motor manufacturers who have been building motors to existing Canadian standards, or who wish to compete in the American market, to redesign their products to meet the new standards, which in some cases allow double the horse-power per frame size than previously, with the same temperature rise, overload and torque characteristics.

The first step towards standardization of motor frame dimensions in this country was taken last year when the British Standards Institution produced Draft Specification No. CR(ELE) 4464 which has now been adopted as B.S. 2083: 1954. This lays down a range of outputs and frame dimensions for totally enclosed fan cooled motors from 1 to 25 h.p., based on the original N.E.M.A. standards, except that the h.p. outputs per frame size are higher. Thus, for example, the frame 284 is rated at 7½ h.p. at 1,800 r.p.m. to N.E.M.A. standards, and at 10 h.p. at 1,500 r.p.m. to British standards. The new N.E.M.A. rating for this frame size, however, is to be 15 h.p. at 1,800 r.p.m. Fig. 1 shows the relative frame dimensions for a 10 h.p. four pole motor of (*a*) the present N.E.M.A. standard, (*b*) the British standard, and (*c*) the new N.E.M.A. standard.

Since the re-rating programme in America entails substantial engineering work and a considerable amount of re-tooling on the part of the motor manufacturers, it will be some time before it is completed. It was announced that the first two frame sizes would be completed and on the market by January this year and that the larger frame sizes would become available at five-monthly intervals thereafter, the programme being completed by late 1955.

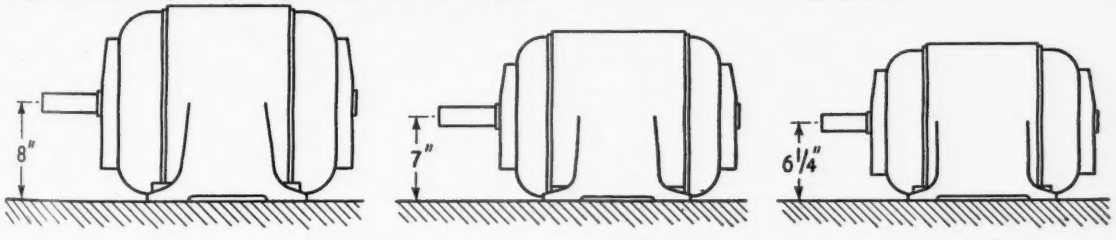
British Frame Dimensions

Many British motor manufacturers have only recently completed the new range of British standard motors, and whilst the leading dimensions of some of these frames are identical with those of the new N.E.M.A. motors of the totally enclosed fan cooled type, several new frames will have to be introduced if we are to be able to offer the complete range on the American and Canadian markets. Some manufacturers also make a protected or drip proof range of motors, interchangeable with the existing N.E.M.A. ratings, and these will also now require to be re-designed. It is not anticipated that any great difficulties will be encountered in this direction, and no doubt much work has already been done towards the necessary modifications.

The trend over the past half century in this country and on the Continent has been gradually to decrease the size of a.c. motors, or conversely to increase the output from a given frame size as improvements in materials and developments in design became available, whereas in America the new standards will incorporate all these improvements in a single step. The question now arises whether any new developments in the future are likely to lead to still further reduction in size, and if so how this might be accomplished.

The design of an electric motor depends upon four factors (1) its thermal performance, (2) its electrical performance, (3) reliability, and (4) cost, and each one of these has an important bearing in determining its physical dimensions. The first of these factors is usually the

* Brook Motors, Ltd.



Outline diagrams of 10 h.p. totally enclosed 4-pole motors (scaled). (a) Old N.E.M.A. frame, (b) a British Standard frame, (c) new N.E.M.A. frame

most important in this respect, as the rated output of a motor is based upon its temperature rise, which according to British standards is limited at present to 40 deg C for protected types and 50 deg C for totally enclosed types.

During the early part of the century practically all motors depended upon natural ventilation for the dissipation of heat generated within the motor due to the iron and copper losses. Motor frame sizes were disproportionately large compared with their rated output, particularly in the case of totally enclosed motors. Hitherto design and development had been almost completely concerned with electrical problems, and thermal design had received very little attention. During the 1914–18 war, natural ventilation began to give place to forced ventilation by means of fans mounted internally on the motor shaft or fixed to the rotor. A few years later the totally enclosed fan cooled motor was developed, which enabled totally enclosed motors up to about 20 h.p. to be built in frames little larger than protected ventilated types. Since then thermal design has received a great deal of scientific consideration, and it is this factor which has without doubt done more than anything else towards the development of the smaller motor.

Problems of thermal design include heat transfer, ventilating systems and fan design. Heat transfer involves the flow of heat from its source within the motor, through the thermal resistance of the insulating materials to the surface, and from the surface to the ventilating air within and without the motor. Better contact between the laminations and the frame assists in heat dissipation, and methods have been developed to pick up the heat from the winding surfaces more effectively by directing ventilating air over them by means of well designed baffles and ventilating systems. More rapid transfer of rotor heat has been made possible by the casting of integral rotor conductors, end rings and ventilating fans.

There is no doubt that the better and more efficient utilization of the space within the motor frame, due to improved thermal design, has contributed greatly to the new uprating of the N.E.M.A. motors.

Qualities of Materials

The next important step in development can be attributed to the great progress made during the past ten years in improving the qualities of insulating materials. Wire covered with a thin coating of synthetic resin has almost completely replaced the old double cotton covered wire formerly used for motor windings. This permits a much greater volume of copper to be put in the same slot area, thus considerably reducing the copper losses, allowing a higher electrical loading and hence increasing the available output from the machine. Wire covered with this material has a much higher temperature capacity, increased dielectric and mechanical strength, and is vastly superior to the oil based enamel covered wires. Synthetic materials used for slot linings and interphase insulation are also thinner than the paper and cotton insulations formerly used. This, again, allows a higher slot factor, and affords better heat transfer from the winding to the core. Impregnating varnishes which formerly consisted of natural resins, oils and solvents are now made from controlled synthetic materials, which impregnate, bind and protect the windings much more thoroughly.

The other active material used in the construction of an induction motor is electrical sheet steel. There are several grades and qualities of sheet steel available, each with its own specific magnetic properties and particular application. The iron losses due to hysteresis and eddy currents vary with the quality and thickness of the laminations and with the magnetic density at which they work.

The loss in watts per pound for a given thickness and at a given induction density is less than half in the highest than in the lowest grade. Thus by substituting a higher grade of steel, the iron losses and hence the temperature rise can be reduced. In rotating machines, however, where probably 60 per cent or more of the magnetizing ampere turns are required to magnetize the air gap, the improvement in the magnetic qualities of the iron does not play as important a part as it does in transformer design. Moreover, although the loss in watts per pound is less in steels with a higher silicon content, this advantage is offset to some extent by the fact that more ampere turns are required to magnetize them to the same density. To what extent the use of higher grade steel is responsible for the increased output of the American motors is not certain, as this is essentially a question of economics.

Scope for Further Reduction

It can be said, therefore, that the three factors which have made possible the very great reduction in size of electric motors which has taken place during the past half century are: improved thermal design, the great advance made in the production of better and thinner synthetic insulating materials, and to a lesser extent, improvement in the magnetic properties of steel. We can now consider whether any further progress in these directions is likely to lead to still further reductions in size in the future.

In motors of modern design the space within the motor frame is now utilized to the greatest possible extent, and the design of efficient ventilating systems and fans has reached a stage where further improvements of an economic nature do not appear to be possible. The practical limit in this direction has now almost been achieved and therefore very little further reduction in size can be expected from this source.

The output of a motor is proportional to the product of the electrical loading and the magnetic loading, and if more output is to be obtained from a given mass of material, one of these must be increased. To increase the electrical loading without increasing the temperature would mean getting still more copper into the same space. The insulating covering of wire is now extremely thin, and it is improbable that any further reduction in thickness could be made. More copper could therefore only be employed at the expense of tighter windings which, as every electrical designer is aware, is impracticable owing to the increase in cost and difficulties in production. We can expect little in this direction therefore so long as the present temperature limits are maintained.

The limitation of the output of electrical machines is determined by the saturation of the iron in the magnetic circuit. In modern motor design the magnetic density is approaching the practical limit, and no substantial increase in output from a given core size is likely, unless the metallurgists can produce at a reasonable cost, a magnetic steel which saturates at a higher flux density and if possible has lower losses. At the present time there is no indication that such an ideal is likely to be achieved, but it remains a possibility for the future.

It seems, therefore, that if in the future motors are to get still smaller, the only way this can be done will be to increase the maximum temperature at which they are permitted to work. There are still tremendous possibilities for improvement in the field of new and improved forms of insulating materials, particularly in regard to their thermal endurance. Only two classifications of insulating materials are at present in general use in the manufacture of small and medium sized motors. Class A consists of impregnated organic materials such as paper and cotton, enamel and synthetic resin coatings on wires, the temperature limit

laid down in the current B.S. 168 for this class being 40 deg C rise above maximum ambient of 40 deg C, for ventilated type motors. Class B consists of inorganic materials such as glass fibre, mica, etc., the corresponding temperature rise allowed being 50 deg C. These temperature limitations allowed a liberal margin of safety for cotton and paper insulations, but most of the synthetic materials now generally used will withstand considerably higher temperatures, yet are still included under Class A. Inorganic materials in built up form with binding substances composed of silicone compounds are broadly covered by the designation "Class H." These will withstand considerably higher temperatures again. Working temperature limits have not yet been fixed in this country, but have been provisionally fixed in America at 180 deg C maximum. Other chemical compounds such as "Fluon," capable of extremely high working temperatures, are also available, but the cost is prohibitive except for very special applications.

The whole question of insulating materials is at present being investigated by a special committee of the International Electrotechnical Commission, who have been assigned the task of revising the present method of classifying insulating material used in rotating machinery. Sufficient test data relating to thermal endurance and other properties are not yet available, and it may be several years before they are able to make any concrete recommendations.

It is reasonable to assume, however, that in a few years' time the thermal limits for motors with these types of insulation will be raised, and that by that time it may be possible for the chemists to produce these materials in quantity and at an economic price. Up-rating would then again be possible, but only to a limited extent, as economic considerations would have to be taken into account.

The efficiency of a motor is the maximum when the variable losses are equal to the fixed losses. The variable losses are proportional to the square of the current input, and the fixed losses include the iron losses. The maximum efficiency is therefore determined by the fixed losses, and usually occurs in a well designed motor at about 70 to 80 per cent of full load. Using existing grades of steel, increasing the magnetic loading also increases the iron loss, and therefore causes a reduction in the maximum efficiency. Similarly an increase in the electrical loading would entail higher variable losses and a reduction in efficiency on the higher loads.

To summarize, it can be fairly safely said that while the present temperature limits are maintained, any further substantial reduction in motor size, beyond those already recommended, would be impracticable. Should an international standard of temperature limits for insulating materials be arrived at, and higher working temperatures be permitted, then some reduction may be expected. With normal type industrial motors this reduction could not be very great without some sacrifice in working efficiency. The main advantage of such a development would be that motors required for working in high ambient temperatures could be made without increase in size, and that special motors could be produced for applications where space is limited and temperature and efficiency are not important. It can be expected, however, that once the details of the new standard motor are finally settled, they will remain unchanged for some considerable time to come.

Research on Capacitors

Two Recent E.R.A. Reports

THE object of the investigation described in E.R.A. Report L/T305, "An Investigation on Aluminium Electrolytic Capacitors and the Development of a New Type of Aluminium Oxide Capacitor," by G. C. Robinson (price 15s), was to determine whether the working temperature range of aluminium oxide electrolytic capacitors could be extended. The minimum temperature at which electrolytic capacitors can be operated without serious loss of capacitance depends upon the conducting properties of the electrolyte at low temperatures, the electrolyte acting as a series resistance. It was known that the low temperature limit could be appreciably reduced by using special electrolytes which were more mobile and conductive than those normally used. With these special electrolytes, however, deterioration at elevated temperature and corrosion troubles were much increased.

In Part I of this investigation different kinds of industrial electrolytic capacitors were examined, their temperature characteristics were determined and their performance under stress at elevated temperature was studied. Part II of the report is a fundamental study of the anodic forming process and of the properties of the oxide layer. It is shown that most of the current through the oxide occurs at a limited number of microscopic faults which, in the presence of an electrolyte and whilst under electric stress, are self-repairing but, in the absence of stress, eventually cause excessive conductance.

This knowledge of current distribution has led to a new development of a dry aluminium oxide capacitor in which the faults are permanently cleared during manufacture or during subsequent use. This development, which is still in an early stage, is described in Part III of the report.

A satisfactory technique has been established and is in operation by B.E.A. for assessing the relative merits of various types of overhead line insulators in relation to their performance under conditions of industrial pollution. No corresponding technique is available for assessing the performance of insulators under conditions of salt pollution.

Polystyrene Film

Difficulties have been encountered in the industrial production of polystyrene film capacitors owing to the very high rejection rate on heat treatment of the units, an essential part of the manufacturing process.

It has been shown that the main cause of failure is the inadvertent introduction by the machine operators of occasional particles of greasy material, the grease having a plasticizing action on the film during the heat treatment and causing holes to be formed in the neighbourhood of the particles by local relaxation of the oriented polystyrene film. The commonest source of harmful particles is dandruff from the scalp, which is impregnated with natural body oils. Ordinary dust appears to be relatively harmless.

Precautions in manufacture to avoid this trouble are suggested in Report Ref. L/T289, "Oriented Polystyrene Film Capacitors. A Major Cause of Premature Breakdown," by H. F. Church (price 7s 6d).

Copies of these reports are obtainable, at the prices stated, from the British Electrical and Allied Industries Research Association, Dorking Road, Leatherhead.

LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Anti-Static Rubber for Medical Use

CERTAIN resistance limits have been agreed between the medical authorities and the manufacturers of anti-static rubber and are published in B.S. 1938:1953. These limits have been fixed with the object of allowing sufficient leakage of static electricity when on the upper limit, and the lower limit has been set so that excessive heating does not occur should mains voltage appear across the rubber, due to fault conditions. These limits are obviously sound from the safety angle, but it appears from inquiries made that rubbers to the requirements (100,000 ohms to 1 megohm) are not a practical manufacturing proposition, because of their unstable nature.

As one concerned with the manufacture of equipment used in operating theatres do I ignore the requirements with detrimental effects to safety, or what do I do? Even the British Rubber Development Board will not give an answer in writing whether or not it is possible to manufacture rubber to the prescribed limits on a production basis.

Walton-on-Thames. E. O. MULLER,
Electrical Designer,
Amalgamated Dental Engineering Industries, Ltd.

Reversing Earth and Neutral

REFERRING to Mr. F. Cooper's letter in the *Electrical Review* of 15th October, I have found that, provided the earth is not taken back to the cable sheath at the cut-out, a ready means of location is by using a search-coil and earphones on the suspected l.v. network. This picks up the magnetic field of the 50 c/s current which is going into the consumer's premises by the cable and returning by way of gas or water pipes. This current appears to become balanced at approx. 50 yd each side of the consumer's premises, and therefore there is an ascending noise level as one approaches the fault.

The foregoing, of course, only applies whilst the consumer is using his or her apparatus.

Portchester. P. H. ROCHEFORT.

The Case for the Tramways

THE statement on this subject by Mr. G. H. Warne in your issue dated 22nd October appears to be biased. Many towns and cities in Great Britain, where there are not any trams, or tramlines, suffer greater inconvenience from traffic congestion than occurs in Glasgow. It is possible that Mr. Warne may know Buchanan Street, Glasgow, where neither trams nor buses are running, yet it is one of the most congested thoroughfares in the city. It appears that many of those generally opposed to electric traction are now getting in one another's way.

Present-day traffic congestion is caused by many factors, the primary one being evolution.

I consider that the suggestion contained in the last paragraph is very unfair to many borough engineers—even if the implication has a wider range. Why should a borough engineer refrain from preparing and maintaining the highway in tiptop condition where tramway track is laid, when he knows full well that the obligation of maintaining the highway—or 50–60 per cent of it—is the financial responsibility of the tramway authority.

When I see letters deprecating the continued employment of electric trams (and/or electric trolley-buses) appearing in the technical and other Press over the name of an author who is associated with electrical engineering, it causes me to wonder whether the signatory has experience in providing an efficient public road-transport service; responsibility for the sale of electric energy; recognized—or is really interested in—the value of an electric tramway, or electric trolley-bus undertaking to the electricity supply industry as a consumer taking electricity at a good load factor.

Whatever shortcomings the electric tramway system may have, alternatives are not without them, and I am certain that the distinct advantages are often overlooked. Even the detractors must admit that the electric tram is the most efficient and expeditious passenger road-transport system for dealing with high-density traffic, shown by the fact that a single line of single unit modern railcars on street track will move 13,500 people an hour against 9,000 by motor-buses and 1,575 by motor-cars; the electric tram (and also the trolley-bus) is not dependent on an imported fuel; and the tramway authority is a large local ratepayer and in addition it relieves the ratepayers from having to contribute a great amount of money towards the cost of road maintenance on all highways where tramway track is laid.

Bristol. E. JOHNS.

BIRMINGHAM and Brussels I know not: Glasgow and Sheffield see me but rarely, but South-East London has been my "stamping ground" and I claim to speak with some authority.

Having been concerned with distribution in that area since 1922 I have motored in and through it at all times of the day and year and under all conditions of weather. Since the passing of the trams my daily journey has been shortened by some ten minutes or so in time and years have been added to my life through the removal of the nervous strain attendant on maintaining the eternal vigilance necessary to avoid colliding with passengers descending from or boarding trams in the middle of the road, often while they were on the move.

It will please Mr. F. K. Farrell, however, to know that I lament the disappearance of the rails since they "kept me on the right track" in the literal and figurative sense during many a "pea-souper."

Bromley, Kent. E. H. JESTY, A.M.I.E.E.

I CAN assure Mr. Warne that I have travelled in almost every large town in the British Isles, and I have not been able to detect any great difference in traffic congestion between those with trams and those without. I am aware that the 9ft of road is often occupied by stationary and slow-moving vehicles, so that motorists must follow the trams, but where these are modern an average speed of 13 m.p.h., including stops, is attained, which is as high as can be expected in a busy city street. Where trams are absent, the slow-moving vehicles tend to straddle two traffic lanes and reduce all traffic to their level.

I agree that loading in the carriageway is both dangerous and obstructive, but the use of loading islands at all main stops would eliminate this. Before the war I was familiar with the Birmingham one-way street where trams proceeded against the normal flow, but while I would not recommend such a scheme, it actually caused little trouble.

In saying that motorists would only prefer to ride by tram to view the Blackpool illuminations, Mr. Warne is admitting that really modern trams would attract the motorist as they have done in many American cities.

F. K. FARRELL, B.A., A.M.I.E.E.

*London, S.W.*18.

[This correspondence is now closed.—Editors, *Electrical Review*.]

Commercial or Domestic?

MY attention has been drawn to a paragraph in "Views on the News" by "Reflector" in your issue dated 29th October, in which some criticism is made with regard to a representation which came before the Yorkshire Electricity Consultative Council.

The point at issue was whether the premises were indeed flats, as contended by the consumer, or a hotel, as contended by the Electricity Board. The Council decided that since the flats consisted of one room only, used as a bedroom, with a communal dining-room, lounge and other services, the premises were a private hotel rather than a block of self-contained flats, and were therefore being correctly charged under a commercial tariff.

Scarcroft, Leeds. E. LUSCOTT,
Secretary,
Yorkshire Electricity Consultative Council.

Variable-Speed A.C. Drives

REFERRING to Mr. T. White's letter in the *Electrical Review* of 5th November regarding the diagram Fig. 7 of my article on "Variable-Speed A.C. Drives," Mr. White is quite right; Fig. 7 in the article was incorrect and he has put the mistake right in the diagram published with his letter.

I should like to thank Mr. White for drawing my attention to this mistake.

Newcastle-upon-Tyne. A. T. ROBERTSON.

Standard Frequency Radio Transmissions

AT a joint meeting of the Radio and Measurements Sections of the Institution of Electrical Engineers on 10th November three papers were presented on standard frequency radio transmissions. The first, by Dr. L. Essen, was an official communication from the National Physical Laboratory which dealt with the general subject with reference to standard frequencies of 2·5, 5, 10, 15 and 25 Mc/s, giving a radial coverage of 1,000 miles.

Accuracy for many purposes could, he stated, be better expressed in cycles per second than as a proportion of the frequency and had consequently increased as the higher frequency radio bands had come into use. Although an accuracy of comparison of $\pm$ 2 parts in 10^8 could be relied on when the wave was reflected from the E layer of the ionosphere, random variations of several parts in 10^7 occurred at other times with a systematic effect at dawn and sunset.

An accuracy of $\pm$ 2 parts in 10^9 could be achieved with the experimental transmission on 60 kc/s and by using the timing pulses of the h.f. transmissions with high grade local standards and fairly elaborate local equipment. If an accuracy of 1 part in 10^9 were required, as seemed probable, either a low-frequency transmission or the 1 c/s pulses of the high-frequency transmissions must be used. No low frequency could, however, be allocated to standard transmission services (in view of many claims on the bands within this range) unless the need were universally admitted. The station could be used for frequency standardization and still carry a full modulation programme, although the incorporation of other useful features of regular 1 c/s pulses and standard modulation frequencies would be difficult.

The present objection to Droitwich (200 kc/s) was that the frequency was subject to international readjustment every five years and any departure from a multiple of 100 kc/s would destroy much of its value.

Equipment at Rugby Station

In a second paper equipment at Rugby radio station was discussed by Mr. H. B. Law (Post Office Research). This station, he said, had operated a 24-hour service from May 1953 on carrier frequencies of 2·5, 5 and 10 Mc/s, which included modulation frequencies of 1 kc/s and 1 c/s and for one hour each day on 60 kc/s. Transmissions were controlled by one of three highly stable oscillator-clock chains, checked daily in terms of a frequency standard. Frequencies were normally kept within 1 part in 10^8 and day-to-day variations were usually less than $\pm$ 2 parts in 10^9. Automatic shut-down features reduced the risk of broadcasting incorrect frequencies under fault conditions. Continuity of operation, especially of temperature control was essential; it might take weeks for equipment to recover fully from one hour's interruption. As an emergency alternative to mains supply a 240 V 50 Ah float-charge battery provided for h.t. requirements and, via a motor alternator, for valve heaters and crystal ovens. Results obtained indicated that quartz-clock equipment of the highest accuracy could be operated under radio station conditions. It was hoped that work on frequency standards utilizing atomic resonances would soon allow the equipment to be calibrated with the accuracy that its stability merited.

Automatic Measurement and Recording

The third paper, an official communication from the National Physical Laboratory, which was presented by Mr. J. McA. Steele, described monitor equipment constructed at the N.P.L. for automatic measurement and recording of the standard frequencies transmitted from the Rugby station and the 200 kc/s carrier frequency at Droitwich. For the last named the standard deviation of measurements lasting a few seconds was 3 to 4 parts in 10^9 and for the 60 kc/s from Rugby 2 to 3 parts. Measurements of the 1 c/s pulse modulation at 60 kc/s showed that the scatter of a group of 60 readings daily seldom exceeded 30 μsec. Frequency changing by continuous phase shifting enabled received frequencies of Rugby 2·5 and 5 Mc/s to be recorded on a meter of range $\pm$ 1 c/s, the discrimination being 2 parts and 1 part in 10^8. Well defined diurnal variations were observed on 2·5 Mc/s, amounting to several parts in 10^7 at sunrise. The received frequency of 5 Mc/s was subject to continuous variations over a range of about 1 part in 10^7 by day, which were increased during the night.

I.E.E. Membership

The Institution of Electrical Engineers has published a new edition (dated 1st July, 1954) of Part II of its list of members—associates, graduates and students. It has also produced a supplement to Part I—corporate members and companions, giving additions since 1st July, 1953, up to 1st July last.

Domestic Electrical Equipment

Immersion Heaters

THE immersion heater is generally considered to be the simplest and cheapest method of supplementing an existing solid fuel water heating system by electric operation. It can be taken that the average quantity of hot water used per person daily is from ten to fifteen gallons and, in terms of electricity consumption, this would equal two to three kWh.

Present-day models are designed to cover most of the variations likely to be encountered in domestic plumbing systems and the average immersed length ranges from 10in to 36in. They are suitable for use in reasonably hard water, but it is always recommended that as long an element as possible should be used in order that the surface temperature of the element sheath shall be kept to the minimum, thus discouraging scale formation and consequent loss of efficiency.

Operating on the principle that water rises when heated, the use of circulators for fitting over an existing heater provide for a speedier supply of small quantities of hot water, but these are only advised in soft water district.

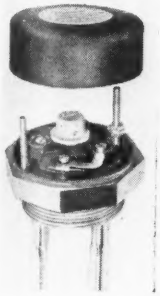
Prices shown in the following survey are for the heaters only (except where otherwise stated) but in most cases provision is made for a thermostat in the form of a pocket in the heater itself. Due to the fact that thermostats are sold free of purchase tax these are supplied separately, and the prices range from 35s to 45s for use on a.c. Those for d.c. operation are more expensive, as these models incorporate a mercury tube.

Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Price (excl. tax)	Purchase tax	Remarks
AIDAS ELECTRIC, LTD., Sadia Works, Rowdell Road, Northolt, Greenford, Middlesex.	"Dumpy"	Non-withdrawable	10½ to 20	2 kW	£2 5 0	£0 16 6	
	"Dumpy"	Non-withdrawable	24 to 27	2 kW	£2 7 6	£0 17 5	2½in B.S.P.T. head. Thermostat pocket fitted.
	"Dumpy"	Non-withdrawable	15 to 30	3 kW	£2 7 6	£0 17 5	
	"Grid"	Non-withdrawable	—	2 kW	£2 12 6	£0 19 3	1½in B.S.P.T. head. Thermostat pocket fitted.
	"Grid"	Non-withdrawable	—	2 kW	£2 7 6	£0 17 5	1½in B.S.P.T. head. No provision for thermostat.
	"U"	Non-withdrawable	10½ to 20 UT2 14½ to 30 UT3	2 & 3 kW	£2 5 0 UT2 £2 7 6 UT3	£0 16 6 UT2 £0 17 5 UT3	1½in B.S.P.T. head. Thermostat pocket fitted.
	"U"	Non-withdrawable	10½ to 20 U2 14½ to 30 U3	2 & 3 kW	£1 18 0 U2 £2 4 0 U3	£0 14 0 U2 £0 16 2 U3	1½in B.S.P.T. head. No provision for thermostat.
	"Spirod"	Non-withdrawable	18 to 24	2 kW	£3 5 0	£1 3 10	2½in B.S.P.T. head. Thermostat pocket fitted.
	"Spirod"	Non-withdrawable	10½ and 21 to 36	3 kW	£2 15 0 (10½) and £3 10 0	£1 0 2 (10½) and £1 5 8	
	"ATC2"	Withdrawable	21 to 30	2 kW	£5 7 0 to £6 3 6	£1 19 3 to £2 5 4	2½in B.S.P.T. head.
	"ATC3"	Withdrawable	21 to 36	3 kW	£5 12 6 to £7 0 0	£2 1 3 to £2 11 4	Thermostat pocket fitted.
	"ATC4"	Withdrawable	27 to 36	4 kW	£6 11 0 to £7 7 6	£2 8 1 to £2 14 1	
	"IH"	Withdrawable	10 to 20	250 W to 500 W	£1 8 3 to £1 13 9	£0 10 5 to £0 12 5	¾in B.S.P.T. head. No provision for thermostat.
	"PTL"	Withdrawable	10½ to 16½	1 kW to 2 kW	£1 16 0 to £2 0 0	£0 13 3 to £0 14 8	1½in B.S.P.T. head. No provision for thermostat.
BELLING & CO., LTD., Bridge Works, Southbury Road, Enfield.	56A	Horizontal mounting	13 11/16	1½ kW	£3 9 6	£1 5 6	Thermostats not fitted to these models. Withdrawable elements.
	57	Horizontal mounting	16 11/16	2 kW	£4 8 0	£1 12 4	
	58	Horizontal mounting	24 3/16	3 kW	£5 10 0	£2 0 4	
BENHAM & SONS, LTD., 66, Wigmore Street, London, W.1.	—	2in gas thread	4¾ to 15¾	1 kW to 4 kW	£4 2 0 to £5 7 6	£1 9 11 to £1 19 3	No thermostat. Non-withdrawable elements.
	—	2in gas thread	8½, 12 and 15¾	2, 3 and 4 kW	On application	—	Thermostat fitted. Non-withdrawable elements.
BERRY'S ELECTRIC, LTD., Touchbutton House, Newman Street, London, W.1.	—	2½in B.S.P.T. head	11½ to 36	3 kW	£2 7 3 to £2 12 0	£0 17 4 to £0 19 1	No thermostat. Embedded element.
	—	1½in B.S.P.T. head	14	3 kW	£2 4 1	£0 16 2	
	—	1½in B.S.P.T. head	10 and 16	2 kW	£2 4 1	£0 16 2	

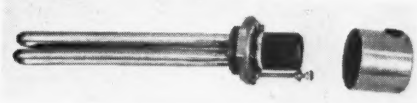
Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Price (excl. tax)	Purchase tax	Remarks
C. H. BLACKBURN & CO., LTD. 10, Gr[illegible]ys Inn Road, Lond[illegible]n, W.C.1.	"Stellex"	W212H	12	2 kW	£3 8 6	£1 5 2	All mounted on 2½in head and complete with pocket to accommodate 11in thermostat. Embedded elements.
	"Stellex"	W221HV	21	2 kW	£4 1 6	£1 9 11	
	"Stellex"	W312H	12	3 kW	£3 15 0	£1 7 6	
	"Stellex"	W321HV	21	3 kW	£4 9 0	£1 12 8	
GEO. BRAY & CO., LTD., Leic[illegible]ter Place, Black[illegible]man Lane, Leed[illegible]2.	"Tubalox"	LAMS	11½	2 kW	£4 9 6	£1 12 10	Fitted with 11in a.c. thermostat pocket. 2½in B.S.P. sweating flange.
	"Tubalox"	LAMS	13½ to 18	2 or 3 kW	£4 19 6	£1 16 6	
	"Tubalox"	LAMS	21 to 42	2 or 3 kW	£4 19 6	£1 16 6	Fitted with 18in a.c. thermostat pocket. 2½in B.S.P. sweating flange.
	"Tubalox"	LAQD	11½	2 kW	£2 14 6	£1 0 0	Fitted with 11in a.c. thermostat pocket. 2½in B.S.P. sweating flange.
	"Tubalox"	LAQD	13½ to 18	2 or 3 kW	£2 14 6	£1 0 0	
	"Tubalox"	LAQD	21 to 30	2 or 3 kW	£2 14 6	£1 0 0	Fitted with 18in thermostat pocket. 2½in B.S.P. sweating flange.
BRITISH NATIONAL ELECTRICS, LTD., Char[illegible]on, Lond[illegible]n, S.E.7.	B.N.E.	Embedded element	11 and 15	2 kW	£3 14 6 and £4 3 0	£1 7 3 and £1 10 3	Provision for thermostat. Vertical or horizontal fixing.
	B.N.E.	Embedded element	15	3 kW	£4 13 6	£1 14 2	
	B.N.E.	Removable element	16 to 30	2 kW	£4 5 0 to £5 14 6	£1 11 1 to £2 1 11	
	B.N.E.	Removable element	16 to 30	3 kW	£4 15 6 to £6 5 0	£1 14 11 to £2 5 8	
	B.N.E. 19 Outfit	Embedded element	13	2 kW	£3 19 9	£1 9 2	Suitable for thermostat. Horizontal fixing.
	B.N.E. 20 Outfit	Embedded element	17	3 kW	£4 19 9	£1 16 6	
CONTROLLED HEATING UNITS (LONDON), LTD., Avenue Road, Hampton, Middlesex.	"Rubicon"	PN	11 to 16	2 and 3 kW	£2 5 0	£0 16 6	Fitted with stemless thermostat. £1 10 0 extra. Embedded elements.
	"Rubicon"	PN	21 to 30	2 and 3 kW	£2 10 0	£0 18 4	
	"Rubicon"	PN	36 and over	2 and 3 kW	£2 15 0	£1 0 2	
ELTRON (LONDON), LTD., Accrington Works, Strathmore Road, Croydon, Surrey.	"Eltron"	1¼in head	14, 17 and 20	2 kW	£2 12 6	£0 19 3	All fitted with pocket for thermostat.
	"Eltron"	2½in head	14, 17 and 20	2 kW	£2 17 6	£1 1 2	
	"Eltron"	1¼in head	18 to 30	3 kW	£3 10 6	£1 5 10	
	"Eltron"	2½in head	18 to 30	3 kW	£3 15 6	£1 7 10	
	"Eltron"	Anti-freeze	20 (flexible)	100 W	£1 5 0	£0 9 2	For water tanks and cisterns.
	"Eltron"	Ring TL	—	200 W to 1 kW	£0 18 6 to £1 13 6	£0 6 10 to £0 12 4	For boiling eggs, shaving water, etc.

Aidas 10⅝in 3 kW "Spirod" and 10½in 2 kW "Dumpy" immersion heaters

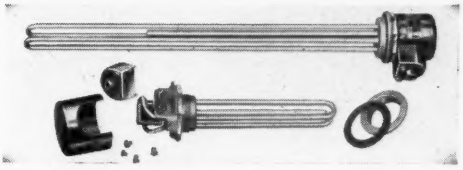
Belling type 58 horizontal mounting immersion heater



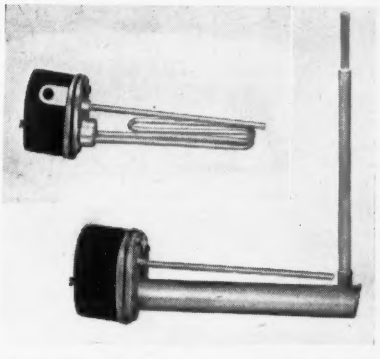
Head of the "Rubicon" type PN heater showing thermostat fitted



Benham 12in immersion element with thermostat



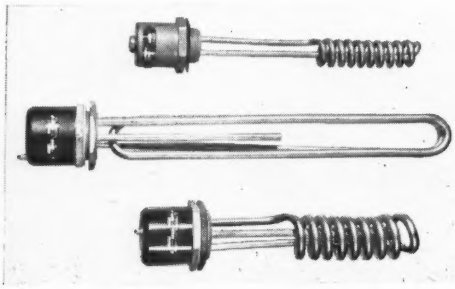
Geo. Bray "Tubalox" type LAMS immersion heaters



British National Electrics horizontal fixing type immersion heater and (inset) the embedded type heater (19 and 20) with mechanical flange

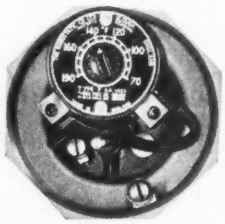
Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Price (excl. tax)	Purchase tax	Remarks
ELTRON (LONDON), LTD., Accrington Works, Strathmore Road, Croydon, Surrey. *(continued)*	"Eltron"	Rod TR	—	2, 2½ and 3 kW	£4 10 0 to £5 10 0	£1 13 0 to £2 0 4	For heating buckets of water, baptismal pools, etc.
	"Eltron"	H.20 for washing machines	—	2 kW	£4 10 0	£1 13 0	Suitable for "Hoover" Mark I.
	"Eltron"	H.25 for washing machines	—	2½ kW	£5 0 0	£1 16 8	Suitable for "Hoover" Mark II.
	"Eltron"	L.R.20 for washing machines	—	2 kW	£4 10 0	£1 13 0	Suitable for small "Goblin," etc.
	"Eltron"	L.R.25 for washing machines	—	2½ kW	£5 0 0	£1 16 8	Suitable for medium round types.
	"Eltron"	L.R.30 for washing machines	—	3 kW	£5 10 0	£2 0 4	Suitable for large "Goblin," "Hotpoint," etc.
FALK, STADELMANN & CO., LTD., 91, Farringdon Road, London, E.C.1.	U.95641	Tubular sheathed	12	2 kW	£2 7 0	£0 17 3	2½in B.S.P.T. head. Thermostat tube fitted.
	U.95641	Tubular sheathed	12 to 27	3 kW	£2 14 0 to £3 15 0	£0 19 9 to £1 7 6	
FERRANTI, LTD., Domestic Appliance Dept., Moston, Manchester, 10.	—	Embedded element	12 to 28	2 kW	£3 10 5 and £5 0 8	£1 5 9 and £1 16 10	2½in B.S.P.T. head. Fitted with thermostat pocket.
	—	Embedded element	16 to 28	3 kW	£4 8 11 to £5 12 2	£1 12 6 to £2 0 8	
H. FISHER (OLDHAM), LTD., Pennant Street, Oldham, Lancs.	"Fisher"	Non-circulator	12 and 16	2 kW	£5 18 10 and £6 6 6	£2 3 5 and £2 6 3	2½in B.S.P.T. head with or without thermostat.
	"Fisher"	Non-circulator	16	3 kW	£6 17 6	£2 10 3	
	"Fisher"	Circulator	22 and 28	2 kW	£6 18 7 and £7 12 11	£2 10 8 and £2 15 11	2½in B.S.P.T. head with or without thermostat. Circulators extra.
	"Fisher"	Circulator	22, 28 and 30	3 kW	£7 1 11 to £7 16 3	£2 11 11 to £2 17 2	
G.B.M. (ELECTRICAL) BIRMINGHAM, LTD., 439, Moseley Road, Birmingham, 12.	G.B.M. "Big Head"	Horizontal or vertical	10 to 42	2 kW	£3 10 0 to £4 13 0	£1 6 2 to £1 14 6	Withdrawable elements. Adjustable thermostat, slip-on circulators, flanges, etc., extra.
	G.B.M. "Big Head"	Horizontal or vertical	10 to 42	3 kW	£3 11 6 to £4 15 0	£1 6 5 to £1 14 9	
	G.B.M. "Big Head"	Horizontal or vertical	12 to 42	4 kW	£5 3 0 to £6 8 0	£1 17 8 to £2 6 10	
GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.	DE3012	Automatic	12	3 kW	£2 7 3	£0 17 3	2½in B.S.P.T. head. Thermostat pocket fitted. Sheathed wire element.
	DE3018	Automatic	18	3 kW	£2 9 7	£0 18 2	
	DE3023	Automatic	23	3 kW	£2 12 0	£0 19 0	
	DE3027	Automatic	27	3 kW	£2 12 0	£0 19 0	
	DE3030	Automatic	30	3 kW	£2 12 0	£0 19 0	
	DE2000	Non-automatic	10½	2 kW	£2 4 0	£0 16 1	1¼in B.S.P.T. head. Sheathed wire element. Horizontal mounting.
	DE3000	Non-automatic	14½	3 kW	£2 4 0	£0 16 1	

Falk Stadelmann U.95641 tubular sheathed immersion heater

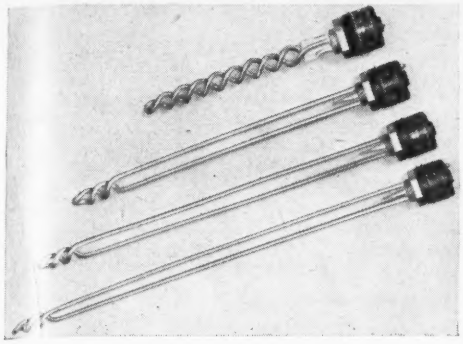


Range of "Eltron" domestic type immersion heaters

Right: "Eltron" flexible anti-freeze heater showing straight (for hanging into water tank) and bent (for fitting into shallow tank)

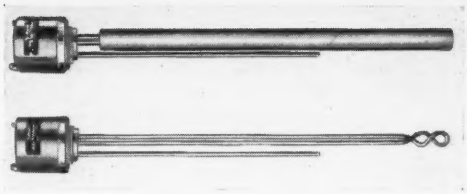


Head of one of the basic range of G.E.C. immersion heaters showing the easy wiring features

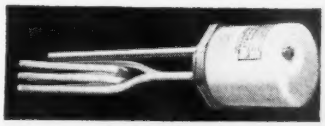


Four of the standard range of Gillott "Duo Coil" immersion heaters

Right: T. B. Morley "TeBeam" S.273 standard type immersion heater with and without circulating tube



Above: Grubb embedded type immersion heater. Right: Heatrae "Slimrod" horizontal type immersion heater



Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Price (excl. tax)	Purchase tax	Remarks
GILLOTT ELECTRO APPLIANCES, LTD., Cotswold Works, Chalford, Nr. Stroud, Glos.	"Duo Coil"	H.14 —1½ H.14A—2½	14	2½ kW	£2 6 0 H.14 £2 11 9 H.14A	£0 16 10 H.14 £0 18 11 H.14A	Thermostat fitted to all models.
	"Duo Coil"	V.23 —1½ V.23A—2½	23	3 kW	£2 8 3 V.23 £2 14 0 V.23A	£0 17 7 V.23 £0 19 9 V.23A	
	"Duo Coil"	V.29 —1½ V.29A—2½	29	3 kW	£2 10 3 V.29 £2 16 0 V.29A	£0 18 5 V.29 £1 0 6 V.29A	
	"Duo Coil"	V.35 —1½ V.35A—2½	35	3 kW	£3 6 9 V.35 £3 12 6 V.35A	£1 4 5 V.35 £1 6 6 V.35A	
GRUBB ENGINEERING CO., LTD., Mary Street, Birmingham, 12.	"Grubb"	Withdrawable element	10 to 42	2 kW	£3 15 6 to £5 15 0	£1 7 7 to £2 2 0	2½in B.S.P.T. head. Provision for thermostat.
	"Grubb"	Withdrawable element	10 to 42	3 kW	£3 17 6 to £6 0 0	£1 8 3 to £2 1 10	
	"Grubb"	Embedded element	10 to 20	2 kW	£1 19 6 to £2 1 6	£0 14 5 to £0 15 2	1½in B.S.P.T. head.
	"Grubb"	Embedded element	10 to 20	2 kW	£2 4 6 to £2 7 0	£0 16 3 to £0 17 2	2½in B.S.P.T. head.
	"Grubb"	Embedded element	11 to 30	3 kW	£2 7 0 to £2 11 0	£0 17 2 to £0 18 8	2½in B.S.P.T. head.
	"Grubb"	Withdrawable element	16 to 42	4 kW	£4 12 6 to £6 10 0	£1 13 11 to £2 7 6	The two-in-one "Popular."
HEATRAE, LTD., Heatrae Works, Norwich.	"Slimrod"	Horizontal	12 and 15	2 and 3 kW	£2 14 6	£1 0 0	2½in B.S.P.T. head. Pocket for thermostat. Embedded element.
	"Slimrod"	Vertical	21 to 30	2 and 3 kW	£2 19 0	£1 1 7	
HOTPOINT ELECTRIC APPLIANCE CO., LTD., Crown House, Aldwych, London, W.C.2.	A and B	Non-automatic	10 to 18	2 to 5 kW	£2 18 3 to £4 14 4	£1 1 4 to £1 14 6	1½in and 2in B.S.P.T. heads. No thermostat pocket.
	CD and CF	Automatic	10 to 36	2 to 3 kW	£2 7 3 to £3 1 5	£0 17 4 to £1 2 7	2½in B.S.P.T. head. Provision for thermostat.
DUNCAN LOW, LTD., 299, Bell Street, Glasgow, C.4.	76	Vertical	11 to 16	2 kW	£4 2 7	£1 0 0	Embedded elements. Thermostat fitted.
	76	Vertical	16 to 30	3 kW	£4 6 10	£1 1 7	
	120	Circulator side fixing	12	2 kW	£6 15 8	£1 4 5	
	130	Circulator side fixing	16	3 kW	£7 19 3	£1 12 1	
METWAY ELECTRICAL INDUSTRIES, LTD., Canning Street, Kemp Town, Brighton, 7.	Metway	Withdrawable element	12 to 42	2 kW	Upon application	—	Thermostat optional. Circulators suitable for use on 2 kW (above 14in) and 3 and 4 kW (above 26in).
	Metway	Withdrawable element	12 to 42	3 kW	Upon application	—	
	Metway	Withdrawable element	14 to 42	4 kW	Upon application	—	
T. B. MORLEY & CO., LTD., Jameson Street, Hull.	"TeBeam"	S12	12	2½ kW	£2 7 0	£0 17 3	2½in B.S.P.T. head. Embedded elements. Thermostat pocket fitted.
	"TeBeam"	S273	27	3 kW	£2 9 6	£0 18 2	

Santon "Otter" control immersion heater

Below: Simplex "Redhead" non-automatic immersion heater

Santon "Dual" Q type DUO T/Q immersion heater

Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Price (excl. tax)	Purchase tax	Remarks
SANTON, LTD., Somerton Works, Newport, Mon.	"Q"—I.Q.	Non-withdrawable	10 and 16	2 kW	£2 4 6	£0 16 4	1½in B.S.P.T. head. Without thermostat.
	"Q"—I.Q.	Non-withdrawable	14	3 kW	£2 4 6	£0 16 4	
	"Q"—T.I.Q.	Non-withdrawable	10 to 30	2 kW	£3 13 0 to £3 17 6	£1 6 9 to £1 8 5	2½in B.S.P.T. head. Thermostat pocket fitted.
	"Q"—T.I.Q.	Non-withdrawable	10 to 30	3 kW	£3 8 6 to £4 3 6	£1 5 1 to £1 10 7	
	"Q"—T.I.Q.	Non-withdrawable	10 and 21	4 kW	£4 14 0 and £5 7 6	£1 14 6 and £1 19 5	
	"Q" DUO/T.I.Q.	Non-withdrawable	23 to 42	Top 1 kW Depth 3 kW	£5 16 6 to £7 0 0	£2 2 9 to £2 11 4	2½in B.S.P.T. head. Two thermostat pockets.
	"Otter"	Non-withdrawable	11 and 13	2½ and 3 kW	£2 7 3	£0 17 4	2½in B.S.P.T. head. Horizontal. Without thermostat.
	"Otter"	Non-withdrawable	18	3 kW	£2 7 3	£0 17 4	2½in B.S.P.T. head. Horizontal or vertical. Without thermostat.
	"Otter"	Non-withdrawable	23 to 30	3 kW	£2 12 0	£0 19 1	2½in B.S.P.T. head. Vertical. Without thermostat.
	"R"	Withdrawable	12	1 kW	£4 0 6	£1 9 6	2½in B.S.P.T. head.
	"R"	Withdrawable	12 to 30	2 kW	£4 10 0 to £6 9 0	£1 13 0 to £2 7 4	Pocket for thermostat.
	"R"	Withdrawable	12 to 42	3 kW	£5 0 6 to £8 5 6	£1 16 10 to £3 0 8	
	"R"	Withdrawable	21 and 27	4 kW	£7 1 0 and £7 14 0	£2 11 8 and £2 16 6	
SARUM ELECTRIC, LTD. Catherine Court, Catherine Street, Salisbury.	"Chromeray"	IWTC 2212	11½	2 or 3 kW	£2 5 0	£0 16 5	Removable elements. Provision for thermostat.
	"Chromeray"	IWTC 2218	18	2 or 3 kW	£2 7 6	£0 17 4	
	"Chromeray"	IWTC 2224	24	2 or 3 kW	£2 10 6	£0 18 6	
	"Chromeray"	IWTC 2236	36	3 kW	£2 19 0	£1 1 7	
SIMPLEX ELECTRIC CO., LTD., Creda Works, Blythe Bridge, Staffs.	"Redhead"	Embedded element	11½ and 14	2½ or 3 kW	£2 7 3	£0 17 4	2½in B.S.P.T. head. Thermostat pocket fitted.
	"Redhead"	Embedded element	18	2½ or 3 kW	£2 9 7	£0 18 2	
	"Redhead"	Embedded element	24, 27, 30 and 36	2½ or 3 kW	£2 12 0	£0 19 1	
	"Redhead"	Embedded element	10 and 16	2 kW	£2 4 1	£0 16 7	1½in B.S.P.T. head. No provision for thermostat.
	"Redhead"	Embedded element	14	3 kW	£2 4 1	£0 16 7	
SPERRYN & CO., LTD., Moorsom Street Works, Birmingham.	"Angelus"	J2, J4, J6 and J7	12 to 17	1 to 3 kW	£3 2 4 to £4 1 8	£1 2 8 to £1 9 7	1½in B.S.P.T. head. No provision for thermostat.
	"Angelus"	J11 to J25	7½ to 20½	250 W to 2 kW	£1 18 4 to £3 5 0	£0 14 0 to £1 3 7	1½in B.S.P.T. head. No provision for thermostat.
TELSEN ELECTRIC CO. (1935), LTD., Fitzgeorge Street, Rochdale Road, Manchester, 9.	1110	Portable	4	1 kW	£0 17 6	£0 6 7	Tubular. With earthing clip.
	1112	Portable	6	1½ kW	£1 0 0	£0 7 6	For use with bucket.
	1114	Portable	3	700 W	£0 14 0	£0 5 3	Cylindrical. "Bakelite" handle.
	1116	Portable	3½	700 W	£0 14 0	£0 5 3	Flat element. With earthing clip.

VIEWS on the NEWS

By REFLECTOR

THERE was a distinctly Scottish air about the luncheon last week to Dr. J. H. Paterson who is retiring from the chairmanship of the Technical Committee of the Arc Welding Electrode Section of B.E.A.M.A. The guest of honour, the chairman and at least one of the speakers were from beyond the border. But one remark, I thought, was more Hibernian than Caledonian: a speaker referred to the sections of the welding industry as three corners of a triangle and expressed the view that these corners did not come together often enough. It seems to my literal mind that this would mean total extinction.

* * *

In a recent address on export matters to the National Union of Manufacturers Mr. Leslie Gamage (president of the Institute of Export) spoke on the subject of keeping delivery promises. He quoted a case in which his company had delivered a rectifier equipment to Canada right on time. He was in Canada at the time and called upon the customer expecting congratulations on the company's promptitude. Instead there was a complaint that the equipment had arrived before the customer had expected it and the building for housing it was not ready. He had been told that deliveries were always at least six months late and he was relying on this. I do not believe that electrical manufacturers are so unpunctual as suggested. In fact I seem to remember that when generating plant was urgently needed here it was often ready before its accommodation was.

* * *

A writer in the *Electrical World* (New York) noted on a recent visit to this country that electric heating was more in vogue here than in the United States but he deplores the lack of data on the characteristics of the house-heating load. He puts this down to the fact that this load is an all the year round one and, presumably, its effect on the general load curve is not so marked as it would be in the United States with its greater range of temperatures. Our visitor was impressed by the extensive use of electric heating in commercial and industrial establishments, churches and schools and other public buildings. He particularly commends the Scots for their electric heating installations and mentions a school installation which he saw in Glasgow. He concludes:—

> "Such progressive steps will be hailed by the industry in America. At least they will if Americans are as willing to be pupils as they are to be teachers and exponents of electrical living."

* * *

The Electric Lighting (Clauses) Act, 1899, stipulates that the owner or occupier of any premises situated within 50 yards from a distributing main can require the electricity undertaking to give a supply to the premises, subject to certain safeguards. It was said at a meeting of the Mid-Sussex District Committee of the South Eastern Electricity Consultative Council that some people are hanging back from taking a supply on terms which involve some payment or guarantee until a line is provided for other people who are willing to pay. Then if they are within the statutory distance of the line they insist on being given a supply. The chairman of the Committee thought that the law should be amended so that people who went in after the line had been provided should be compelled to pay a certain amount towards the cost and towards reimbursement of those who had contributed to the cost of the line. This is not a new problem; the *Electrical Review* has dealt with it on previous occasions. It should certainly be made impossible for people thus to take advantage of their neighbours. The existence of powers to enforce payment by late-comers to a distributing main might "encourage" people to go in at the beginning and so save much trouble and heartburning.

* * *

A New Zealand correspondent, Mr. O. J. Ruff, sends me a drawing from the Auckland *Star* which suggests that there are still some primitive plants operating in the Dominion. A newcomer tells a native of the township in which he has arrived that he has brought his electric razor and asks whether the supply is a.c. or d.c. To this he gets the reply:—"I don't rightly know, mate, but judgin' by the local power plant it's probably B.C.!"

Mr. Ruff mentions in his letter a system he saw a few years ago in the back-blocks of Australia. In a small country town the power station proprietor had a contract with the local council for street lighting up to midnight. As he did not wish to get out of bed to switch the lights off each night he had rigged up an ingenious combination of rat-trap, alarm clock and wire which was strong enough to pull out the double-pole knife switch on the main board in the station. Mr. Ruff thinks it unlikely that the B.E.A. or Area Boards would employ this method.

* * *

This week I propose to go no further back into the files of the *Electrical Review* than 28th November, 1924, in which was reported (rather belatedly) a meeting held on the 12th of that month. At this meeting Mrs. M. L. Matthews, Graduate I.E.E., read a paper on the development of women's interest in the domestic uses of electricity. After short speeches had been made by Miss Irwin and Mr. J. W. Beauchamp the following resolution was put to the meeting by Miss M. Partridge, B.Sc.:—

> "That this meeting of representative persons, realizing the need to interest women in regard to electrical development in this country, decides to form a Women's Electrical Association and wishes to put on record its thanks to Mrs. Matthews for the initial step in contributing her paper on this subject."

The resolution was carried after speeches by Mr. L. L. Robinson, Sir Alfred Yarrow, Sir Charles Parsons and Mr. R. Borlase Matthews. Miss (now Dame) Caroline Haslett, the honorary organizer, then read a report giving a list of a number of women's organizations who were supporting the new association.

In congratulating the Association on the occasion of its thirtieth anniversary I may mention that it now has over 10,000 members in 143 branches. It is a matter of sincere regret that the celebration of this anniversary has had to be postponed until next year because of Dame Caroline Haslett's illness.

PERSONAL AND SOCIAL

News of Men and Women of the Industry

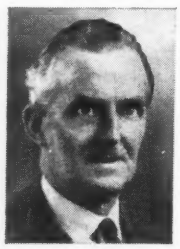
Mr. G. A. Rendle, B.Sc., M.I.E.E., has been appointed to the board of the British Insulated Callender's Construction Co., Ltd. He becomes

Mr. G. A. Rendle

Mr. C. Kibblewhite

manager (cable contracts) in succession to **Mr. C. H. Frankland,** M.I.E.E., who, as we reported last week, while remaining a director of the B.I.C. Construction Co., Ltd., has undertaken special duties at the Trafford Park Works of British Insulated Callender's (Submarine Cables), Ltd. **Mr. C. Kibblewhite,** M.I.E.E., has also been appointed to the board of the B.I.C. Construction Co., Ltd., as an executive director.

British Insulated Callender's Cables, Ltd., announces the appointment of **Mr. E. S. Mackay** as manager of its Leicester branch office. Mr. Mackay served his apprenticeship with Yarrow & Co., Ltd., and afterwards continued his training at Glasgow Technical College. He became the Scottish representative of the Macintosh Cable Co., Ltd., in 1925 and for the next eleven years represented that company in a number of areas. When the company was taken over by British Insulated Cables, Ltd., in 1936 he represented B.I.C., Ltd., in the Midlands until the merger in 1945 with Callender's Cable & Construction Co., Ltd., to form the present B.I.C.C., Ltd., when he continued to act as Midlands representative.



Mr. E. S. Mackay

Mr. J. C. Fraser was succeeded last month in the post of general manager of the Johannesburg municipal electricity department by **Mr. R. W. Kane.**

The National Coal Board has appointed **Mr. Noel Gee,** M.C., to be director of public relations in succession to Sir Guy Nott-Bower, K.B.E., C.B., who retired recently. Mr. Gee has hitherto been chief press officer of the Board.

Dr. J. H. Paterson was entertained at luncheon at the Holborn Restaurant, London, on 4th November upon the occasion of his retirement from the chairmanship of the Technical Committee of the Arc Welding Electrode Section of the British Electrical and Allied Manufacturers' Association. The chairman of the Section, Mr. W. W. Watt, presided and after lunch proposed Dr. Paterson's health. Outlining Dr. Paterson's career, Mr. Watt mentioned that he was a past-president of the Institute of Welding and had played a prominent part in the formation of the British Welding Research Association and the International Institute of Welding. The Electrode Section had been formed in 1939 and Dr. Paterson had been chairman of the Technical Committee from its inception until a few months ago. Throughout his life he had served the whole industry and not merely his own company. The industry had greatly benefited from his work; the volume of output was now four times what it was before the war. Mr. Watt said he had had a letter from Mrs. Paterson, who was unfortunately in hospital, thanking the members for the television set which they had presented to Dr. Paterson.

Supporting the toast, Mr. R. E. Clipsham, chairman, Arc Welding Plant Section, said that the growth of the industry was a measure of the work of the pioneers, among whom Dr. Paterson was outstanding. Mr. J. M. Sinclair, chairman, Resistance Welding Machine Section, also supported the toast, saying that Dr. Paterson had left his mark on every welding development.

In his reply Dr. Paterson was reminiscent and said that he hoped to maintain his connection with the industry in his retirement. He believed that there was more literature and research in the welding section than in any other branch of engineering. In conclusion Mr. Watt paid a tribute to B.E.A.M.A. to which Col. B. H. Leeson (director) gracefully responded.

Mr. F. C. Isaac, A.M.I.E.E., who has been commercial engineer in the Plymouth District for the past six years and was formerly deputy electrical engineer with the Plympton Council Electricity Department, has been appointed district engineer, Plymouth, of the South Western Electricity Board, responsible for the operation and maintenance of the supply system over an area of 358 sq miles, extending from the River Tamar in the west to Ivyoridge in the east and Lifton in the north-west.

The South Western Board also announces the appointment of **Mr. F. A. Hitchcock,** A.M.I.E.E., as deputy to Mr. N. Axford, manager of the Plymouth District. Mr. Hitchcock has been industrial power engineer with the Board for three years. He has done much to develop the use of night storage heaters and will have a special responsibility for consumer service in the district. Before going to Plymouth Mr. Hitchcock was senior commercial assistant in the Luton District of the Eastern Electricity Board.

Mr. F. J. Tucker, assistant district engineer at Guisborough (Yorkshire) with the North Eastern Electricity Board, has retired. He had been connected with the supply industry in the Guisborough area for thirty-eight years, and before then was in South Devon.

Mr. J. H. W. Cope, maintenance engineer (electrical) at Rye House generating station, has been appointed deputy station superintendent, Goldington, in the Eastern Division, B.E.A., as from 1st January next. Mr. Cope commenced his service in the industry with the North Metropolitan Electric Power Supply Co. in 1924, being appointed a shift charge engineer at Brimsdown "B" generating station in 1947, and to his present position at Rye House in September, 1951, when the station was first commissioned.

Mr. G. A. J. Housden has been appointed sales manager of the Water Heating Department of the Simplex Electric Co., Ltd. Mr. Housden was educated at King's College School, Wimbledon, and the Birmingham Central Technical College, and completed a five-year student apprenticeship with the Shropshire, Worcestershire & Staffordshire Electric Power Co. Commissioned in the Territorial Army in 1939, he served in the Field and Flying Branches of the Royal Artillery with the rank of captain. Returning to the S.W. & S. Electric Power Co. in 1946 he went to Leominster as assistant to the district manager. Mr. Housden joined Simplex Electric Co.

Mr. G. A. J. Housden

in 1949 as sales representative in the Midland area, becoming "Creda" sales engineer early this year, covering the Midlands area.

Mr. T. D. Shillcock has been appointed "Creda" sales engineer for the Midlands area as successor to Mr. Housden. Mr. Shillcock was educated at Rugby School and received his commercial training in the electrical wholesale trade. For some years he represented the Simplex Electric Co. in the Home Counties. He was commissioned in the Royal Corps of Signals in 1940 and at present holds the rank of major in a Territorial unit. Returning to the company in 1946 he represented Simplex in the East Midlands, becoming sales engineer early this year in the same area.

Mr. R. Caffelle has been appointed sales engineer in the East Midlands area as successor to Mr. Shillcock. Mr. Caffelle was educated at Bablake School, Coventry, since when he had been with the Coventry Corporation Electricity Department and the East Midlands Electricity Board, with whom he held the position of senior assistant, development.

The Brush Electrical Engineering Co., Ltd., has released **Mr. R. S. D. Bagnall,** at his own request, from his appointment as home sales director, with effect from 31st October. **Mr. L. C. W. Turner,** sales director, has taken over the duties and responsibilities formerly associated with Mr. Bagnall.

Enfield Cables, Ltd., has announced the following appointments:—**Mr. J. G. Jackson,** manager of the Newcastle branch for the past ten years, has been appointed manager of the Glasgow branch; **Mr. F. R. Mackenzie,** manager of the Southampton branch for the past three years, becomes manager of the Newcastle branch; **Mr. W. F. Lawrence,** who has been on the London sales staff for the past four years, succeeds Mr. Mackenzie as manager of the Southampton branch; and **Mr. H. Dennis,** A.M.I.E.E., has been appointed manager of the Manchester branch. Mr. Dennis had spent the greater part of his career with the English Electric Co., Ltd., at Stafford and Liverpool and was latterly manager of the Manchester office of the Brush Electrical Engineering Co.

On Thursday and Friday last week the **Portland Players,** the dramatic section of the B.E.A. Sports and Social Club, gave two performances of "Two Dozen Red Roses," a comedy adapted from the Italian by Kenneth Horne, at the Portcullis Theatre, London. This play has the flimsiest of plots and its success depends largely upon its presentation by the players. A small cast of five successfully surmounted the difficulties of the play and a well filled theatre on each evening accorded the players a warm reception. Phyllis Martin as Marina Verani and Laurence Clark as Alberto her husband, got through their long parts with credit, while James Rintoul as the bachelor friend, deserves full marks for his playing of Tomasso Savelli. Antony Hemming as Bernado the florist, and Pamela Love as the maid, completed an efficient quintet.

Over 200 members of the staff of **Collins Electrical, Ltd.,** and guests attended the annual dinner and dance at the Ardington Rooms, Clapham Junction, on 29th October. Mr. C. E. Collins (chairman and managing director) presided and the opportunity was taken to present a gold watch each to Messrs. P. C. Birkin and C. A. McDonald on their completion of twenty years' service with the company. An excellent cabaret, followed by dancing, rounded off a successful social function.

A dinner arranged last week at the Cock Tavern, Fleet Street, London, by the **"Lightmongers,"** marked the completion of that society's first year. Mr. Max Millar, the president, took the chair and after dinner replied to the toast of his health, proposed by Mr. Frank Rushton. He said that there had been fifteen founder members; the number had now risen to thirty-two. From the surplus funds he presented a cheque to the secretary of the Electrical Industries Benevolent Association, Mr. H. Senior Fothergill, who expressed his thanks. Mr. W. A. Benson proposed the health of the guests on whose behalf replies were made by Mr. A. E. Iliffe and Mr. A. C. Lindsay (South Africa). Mr. Millar then handed over the badge of office to the new president, Mr. W. S. Veness, who gave the toast of the society and its new members. Mr. Tom Jones is the new vice-president and the hon. secretary is Mr. V. G. E. Gardner (Benjamin Electric, Ltd.).

On 29th October, **Mr. Geoffrey Lloyd,** M.P., on behalf of the Queen, presented the B.E.M. to a number of employees in the electricity supply industry. Lord Citrine, chairman, British Electricity Authority, attended the presentations and is seen in the picture below with the employees.

The foremen of **Johnson & Phillips, Ltd.,** entertained members of the company and other guests at a dinner and cabaret at Woolwich Town Hall on 29th October. Mr. S. A. Simmons, chairman of the Association, proposed the toast of the company and Mr. G. Leslie Wates, J.P., chairman of the company, in his reply stressed the responsibility which had been so successfully borne by the foremen. He also referred to the need to face up to increased world competition and the ever growing potentialities of the electrical industry. He commended the apprentices' scheme and emphasized the need for higher standards and increased production, which were clearly evidenced in the recent business which the company had negotiated with Russia. Speeches were also made by Mr. H. Olley, employment and welfare manager, Mr. G. Knight, Mr. S. Windall and Mr. H. Wilson, of Telcon, on behalf of the guests.

At the annual general meeting of the Incorporated Sales Managers' Association, held in London on 4th November, **Mr. Cyril Derry,** Fellow of the Association, was elected national chairman for the ensuing year.

Mr. W. H. Court has been appointed director-secretary of Bennett & Fountain, Ltd. He has been with the company for nineteen years.

The twenty-fifth birthday of the Edinburgh Branch of the **Electrical Association for Women** was marked by a celebration dinner on 28th October under the presidency of Miss Rodney Murray, who responded to the Branch toast given by Miss Norah Balls, J.P., chairman of the National Executive Committee of the Association. Other speakers were Miss P. L. Wingfield, principal of the Edinburgh College of Domestic Science and vice-president, Edinburgh E.A.W. Branch; Professor M. G. Say, head of the Electrical Engineering Department, Heriot-Watt College; and Mrs. M. E. C. Stewart, past-chairman of the E.A.W. Scottish Council. The

Back row (left to right): Messrs. H. Scaife (installation inspector, N.E.E.B.), A. Wright (leading stoker, Stoke power station), W. J. B. Chapple (carpenter and joiner, E.E.B.), A. Hawkesworth (mains foreman, L.E.B.) and J. Grieve (leading linesman, S.W. Scotland Board). Front row (left to right): Mr. E. J. Winkworth (leading turbine driver, Southern Division, B.E.A.), Lord Citrine, Mr. W. Pemberton (jointer, N.W.E.B.) and Mr. J. E. Evans (shift charge engineer, Dolgarrog hydro-electric station)

guests included a number of leading representatives of the Scottish electricity supply and contracting industries.

Industry, art and recreational activities were represented at the conversazione held in connection with the **Henley Group** education scheme at Woolwich Polytechnic last Saturday. Mr. E. J. Vidler, general manager, who presided, reviewed the scope of the scheme and pointed out that the students acquired not only theoretical and practical knowledge but also the art of citizenship and democracy. Sir John Dalton, chairman of the Henley organization, then presented awards to students for examination successes and Mr. J. Forster, a fourth year student apprentice, thanked the company for the assistance which the education scheme gave them. The proceedings then turned to leisure pursuits and Mr. W. C. Barry, research manager, presented the challenge trophy and awards for handicrafts exhibits. An exhibition entitled "From Raw Material to the Finished Product" was arranged to demonstrate the processes of manufacture of the many complicated and varied products of the Henley companies. A musical programme was provided by the Royal Artillery Band.

Dr. John Grierson was the guest speaker at last Tuesday's luncheon of the **Electrical Industries Club** at the Connaught Rooms, London, W.C.2. He was introduced by the chairman, Mr. A. B. Wildsmith, and gave a fascinating talk on the origin and development of the documentary film which, he said, aimed at showing the citizen the world he lived in. The vote of thanks was proposed by Mr. H. Senior Fothergill.

On 22nd October the South Wales and Monmouth Branch of the **Electrical Industries Benevolent Association** held its first dinner-dance at the Park Hotel, Cardiff. The function, which was presided over by the chairman of the Branch, Mr. L. Howles, was attended by approximately 250 people, representing all branches of the electrical industry in South Wales. Sir John Dalton, president of the Association, was unable to attend, but was represented by Mr. H. Senior Fothergill. The function showed a profit of £230.

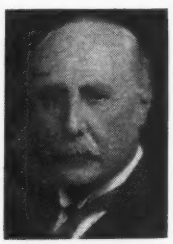
OBITUARY

Mr. R. H. Finch.—The death occurred on 2nd November at St. James' Hospital, Balham, of Mr. R. Harley Finch, aged forty-four, who commenced his engineering training with the British Thomson-Houston Co., Ltd., in 1927 and who since 1935 had been a lighting engineer working on technical sales promotion and specializing in the technical applications of lamps. Mr. Finch gained experience as a junior engineer in a number of London power stations.

Mr. W. M. B. Furniss.—The death occurred on 8th November, at the age of forty-seven, of Mr. William Marter Burne Furniss, managing director of the Electric Construction Co., Ltd. Mr. Furniss was the elder surviving son of Mr. William Marter Furniss, chairman and managing director of the company until his retirement in December, 1953. Mr. W. M. B. Furniss joined the company in 1925 and had held the successive appointments of sales engineer, assistant manager, general manager, and director and manager, before becoming assistant managing director in 1948. He was appointed managing director in January this year. The funeral service was held at Bushbury Parish Church on Wednesday, followed by private cremation.

The late Mr. W. M. B. Furniss

Lord Colgrain, chairman of the Telegraph Construction & Maintenance Co., Ltd., and formerly chairman of the National Provincial Bank, died on 3rd November at the age of eighty-eight. Lord Colgrain (formerly Colin Frederick Campbell) was educated at Eton and started his City career in the family business of Finlay, Campbell & Co., East India merchants (now Forbes, Forbes, Campbell & Co.). He succeeded his father as a director of the Telegraph Construction & Maintenance Co. fifty-seven years ago and had been chairman of the company since 1932. He was raised to the peerage in 1946. A memorial serice was held on Monday last at St. Mary Woolnoth.



The late Lord Colgrain

Mr. Roger Ernest Grime, M.Sc., M.I.E.E., formerly with Mather & Platt, Ltd., Park Works, Manchester, died on 26th October.

Mr. H. Nimmo.—A memorial service for the late Mr. Henry Nimmo, chairman of the Southern Electricity Board, was held at the Queen's Chapel of the Savoy on 4th November. Mrs. Nimmo and her two daughters were present and all branches of the electrical industry and profession were well represented. Those present included Lord Citrine and Sir Henry Self of the British Electricity Authority, Mr. R. R. B. Brown, deputy chairman of the Southern Board, and a number of Mr. Nimmo's fellow Electricity Board chairmen. The Institution of Electrical Engineers was represented by Mr. J. Eccles, the president, and Mr. W. K. Brasher, secretary, and the British Electrical and Allied Manufacturers' Association by Col. B. H. Leeson, director.

PARLIAMENTARY NEWS

IN the House of Commons last week the Minister of Fuel and Power (Mr. Geoffrey Lloyd), replying to Major W. W. Hicks-Beach, said that before giving his consent on 14th July to the erection of a section of the 275 kV supergrid in Gloucestershire he took account of the possible effects of nuclear power development, and his considered view was that the grid would not become redundant in the foreseeable future.

Sunderland Electrical Factory

Mr. Henry Strauss, Parliamentary Secretary, Board of Trade, informed Mr. Paul Williams (Sunderland, S.) that the building of a factory of 210,000 sq ft for the Edison Swan Electric Co., Ltd., at the Pallion Trading Estate, Sunderland, was making good progress. It was hoped that it would be completed by next autumn.

Instrument Exports

Mr. Swingler asked the President of the Board of Trade whether he had considered the evidence which he had received from members of the Scientific Instrument Manufacturers' Association to the effect that the embargo on certain standard types of scientific instruments, by encouraging the eastern European countries to manufacture for themselves, caused damage to the British export trade.

Mr. Low, Minister of State, Board of Trade, said that this evidence was being examined. He emphasized, however, that evidence of this nature was not the only factor which had to be taken into account in settling an internationally agreed strategic control.

Electricity Board Sub-Areas

On Monday Mr. A. J. Irvine asked the Minister of Fuel and Power what general direction he had issued in relation to the disbandment of sub-area organizations in the electricity supply system. Mr. A. J. Irvine also asked the Minister what general directions he had issued that large scale reorganizations within the electricity supply system should not take effect without prior joint consultation.

Mr. Geoffrey Lloyd said that the answer to both questions was "none."

Scottish Electricity Bill

In the House of Lords on 2nd November the Electricity Reorganization (Scotland) Bill was read a third time and passed. It has already been through the Commons.

INDUSTRY AND THE HOUSE

Coal and the Railways

By A. M. F. PALMER, A.M.I.E.E., M.P.

MEMBERS of the House of Commons have returned to Westminster in cautious but observant mood after their summer recess. Controversies both between and within the parties have been damped down by the swift march of international events since July, the holding of the two party conferences and the ever-growing shadow of the next General Election. In any case, for the next few weeks until the Queen opens what is likely to be the last session of the present Parliament on 30th November, we shall be occupied mainly in clearing up the untidy ends of minor outstanding legislation, filling in with bi-partisan debates on foreign affairs and the annual reports of the nationalized industries. Coal has been discussed already, electricity and gas have been dealt with this week (of which more later); and transport in its railway aspect has been favoured with a debate on the reorganization White Paper.

Mr. Geoffrey Lloyd, the Minister of Fuel and Power, told the House in the coal debate that the production of coal, which had fallen in 1953, was rising this year, but he agreed that the rise was not as much as was needed to match the vastly increased consumption. He gave figures to show that coal consumption by the motor industry was up by 8½ per cent, in the chemical industry it was higher by 12½ per cent, while on farms it had grown by 16 per cent. The Government was determined that there should be no failure of fuel supplies which might mar what he called "the buoyant progress of industry." To make certain that nothing would go wrong it had decided to import a further 2 million tons of coal from abroad, making a total of 4 million tons for the present season.

Manpower Position

Stocks were rising and by 1st November should be between 17 and 18 million tons. Mr. Lloyd paid tribute to the National Union of Mineworkers for their co-operation, and pointed out that in January the Coal Board and the men had made an agreement by which they resolved to take all practicable measures to obtain a minimum increase of 2½ per cent in production. Absenteeism had been reduced and from July coal-face workers had been turning out 1½ cwt more coal per shift than last year. Recruitment had been better than last year, although wastage had unfortunately grown worse. The miner did not like changing coalfields and the Board had instituted a welfare scheme in an attempt to deal with that problem.

Coming to the important matter of capital expenditure and re-equipment, the Minister said that this fell into two parts: the installation of new machinery and the sinking of new pits, and the major reconstruction of existing pits. At present 90 per cent of the coal came from pits sunk before 1914; two-thirds from mines sunk in the 19th century. When the enormous task of reconstruction now well in hand by the National Coal Board was complete, four-fifths of our coal would come from new mines or mines completely changed. Capital expenditure by the N.C.B. on collieries had risen from £26 million in 1951 to £52 million last year. This year the estimate would be for about £75 million.

Turning to economy in use, Mr. Lloyd pointed out that while the great public services such as electricity supply were doing a first class job in economizing in the use of coal, he could not say the same of miscellaneous industry. The drive for fuel efficiency was as important to the nation as the export drive.

A revelation which intrigued the House was that billions of cubic feet of natural gas were running to waste in the oilfields of the world. The problem was to carry it to the great consuming areas. The Americans had developed a revolutionary method which consisted, briefly, of using a refrigerator tanker which would liquefy the gas and make it suitable for transportation. If Britain could adapt this method there was enough natural gas in the Middle East alone to provide for half the total United Kingdom consumption. The scheme was believed to be technically feasible and the gas industry had sent a mission to the United States to obtain more information about it.

For the Opposition Mr. Philip Noel-Baker, a former Minister of Fuel and Power, said that he was glad that the present Minister deprecated attacks on the Coal Board, which had been faced with the gigantic task of rebuilding the industry on modern lines. In this tremendous progress had been made since 1947. He did not, however, share the Minister's optimistic view of the success of the fuel efficiency policy. Mr. Noel-Baker thought this to be the most disappointing outcome of Mr. Lloyd's work in his present office. He argued that agreement must be reached on a new wage structure in the industry; more help should be given to miners to transfer from one coalfield where there was ample labour to others where it was short. The country needed a stable labour force of 730,000 miners.

Among Conservative critics of the coal industry were Mr. Enoch Powell, Member for Wolverhampton South-West. He thought the country must seek to get the maximum productivity from the minimum real resources devoted to the production of fuel and power. He feared that the policy on which the new marketing scheme of the N.C.B. was founded would lead to the opposite result. The Labour Member for Cannock, Miss Jennie Lee, a miner's daughter, said that still far too many miners were leaving the industry and higher wages were not always sufficient to keep them. She was receiving letters every day which showed that good mining families were still on the waiting list for houses, which with the present need of the country for coal she thought was scandalous.

Making the Government's reply to the debate, Mr. Joynson-Hicks, the Parliamentary Secretary to the Ministry of Fuel and Power, told the House that with the co-operation of the Minister of Transport it had been possible to arrange for the railways to take over half a million tons of small coal and briquettes. In addition, further railway assistance with the coal problem had been given by the introduction of diesel shunting engines.

Railway Reorganization

Talking of railways, there was sharp Opposition criticism of Government policy in a debate on the White Paper on railway reorganization. Although Mr. Hugh Molson, the Parliamentary Secretary to the Ministry of Transport, argued that the new scheme was a logical and natural development of the British Transport Commission's own

interim scheme which had been operating since October, 1953. It will be remembered that this set up six Regional Managers and left them free to administer their own concerns. The Government's new proposal is to establish in addition six " Boards " responsible for the six Regions, which will be renamed " Areas." Members of the proposed Boards will be found from men and women in contact with commerce, industry and labour and even the travelling public.

Mr. Steele, Labour Member for Dumbarton West, contended that the Government might talk about decentralization in the abstract, but when things went wrong the railway staff had no doubt about who was responsible.

Two Conservative critics entered the debate: Sir David Robertson (Caithness) and Mr. Leslie Thomas (Canterbury). Sir David asked if the Boards were to be made up of busy people from other walks of life coming to listen to what the Regional Manager told them, without powers of criticism or control? If so he could not support the proposal. Mr. Thomas (who is the son of the celebrated J. H. Thomas, the railwaymen's leader of the 1920's) was afraid that the scheme would cause a hindrance to good management which was not necessary or required.

Altogether not a good beginning for railway reorganization. I predict the Government will have second thoughts before the day is done.

Transatlantic Telephone Cable

THE discussion on the I.E.E. paper by Sir Gordon Radley, Mr. R. J. Halsey, Dr. M. J. Kelley and Mr. G. W. Gilman on " A Transatlantic Telephone Cable " (*Electrical Review*, 5th November, page 724) opened with a recorded contribution by Dr. O. E. Buckley (U.S.A.). Dr. Buckley said that the system described represented the most important advance yet undertaken in submarine cable work. The great cost of making repairs once a cable was laid put a high premium on ruggedness and simplicity, and in this project simplicity was necessarily sacrificed to no small degree. Overseas short-wave radio telephony was subject to impairment or interruption by magnetic storms, and there were not enough channels in the short-wave spectrum to satisfy the growing demand. The provision of a telephone cable service across the Atlantic would lead to greater demand, which in turn would lead to more cables, so that he expected cables to become the backbone of transatlantic telephone communication.

Col. Sir A. Stanley Angwin (Commonwealth Telecommunication Board), repeating the observations which he had recorded for the Chicago meeting of the American I.E.E. at which the same paper had been discussed, said that the ideal would be the judicious combination of radio and cable for transoceanic conditions. The proposed cable would provide the possibility of telephony from the United Kingdom to Australia and New Zealand, using the trans-Canada network and radio telephony across the Pacific, and providing communication at times when it was now impossible.

Sir Archibald Gill thought that the project could not cost less than £7 million, and that including interest, amortization, the cost of a repair ship and operating charges the cost would be £670,000 per annum, or £2,700 per business day. Because of the difference in time between London and New York the bulk of the traffic would be confined to 3½ hours in what in London was the afternoon, and, since only 30 paid minutes could be got out of an hour on long telephone circuits, this meant 100 minutes per day on each circuit. If the radio charge of £1 per minute were made, this would mean £3,600 per day and would amply cover the cost.

Mr. A. C. Hartley (past-president, I.Mech.E.) said that a challenge had been made to the mechanical engineer to devise means to enable the rigid repeater to be laid along with the cable in a continuous operation from the cable tank onwards. He showed a number of slides of possible methods, including the use of two continuous caterpillar tracks which opened to allow the repeater to pass through, and an adaptation of the cable drum method whereby, since the rigid repeater could not be taken round the drum, the cable drums were taken round the repeater, four drums being used. Tests had also been made with a mechanism employing two vee-sheaves, the operation of which was shown by a short film.

Major-General Sir Leslie Nicholls (Cable & Wireless) said he believed the project would cost £12½ million, but felt sure it would be successful and would set an example for repeatered telephone cables. He hoped that this country would be first in the field with telephone cables to the Commonwealth.

Brigadier L. H. Harris (G.P.O.) said that they had never been able to find anyone who would offer them a resistor which would last 20 years with 95 per cent security. It would be a godsend if all new components put on the market had to be sent to some independent organization to be put on life tests permanently. With few exceptions, our lack of knowledge of the stability and life of components seemed to be lamentable.

Mr. J. N. Dean (Submarine Cables, Ltd.), in a written communication, emphasized the extent to which the project involved pure science, particularly chemistry and physics, and also chemical engineering.

Dr. E. W. Smith (T.C. & M.) referred to the composite structure of the centre conductor, using three tapes, and, while supporting the use of a type which had been so well proved, suggested that in the future there was a strong case for replacing it by a single solid conductor, which had already been proved by its use in 2,000 miles of deep-sea telegraph cable and which saved about 3 per cent of the attenuation of the cable. He had found no evidence that the composite structure gave better mechanical protection or maintenance of continuity.

Captain W. H. Leech (G.P.O.) emphasized the necessity to repair the cables promptly in the event of failure and said there was need for one if not two repair ships able to operate in the Atlantic. He did not agree with Sir Archibald Gill in wanting a flat top for a cable ship. A ship was required of about 4,000 tons and with a speed of 15 knots, with provision for all the necessary equipment, including machine shops for the repair of repeaters, and able to remain in the Atlantic for long periods in winter.

Mr. F. C. Wright (S.T. & C., Ltd.) mentioned that although the intrinsic value of many of the parts which went into a repeater might be only a few pence it must be recognized that to get such parts it might be necessary to spend an equivalent number of thousands of pounds. He agreed, therefore, with the five-point philosophy of the Bell Laboratories mentioned in the paper, and particularly with the need to develop the worker's faculty of self-criticism.

Mr. R. J. Halsey, replying to the discussion, referred to Brigadier Harris's suggestion of a central testing depot and said he would not place a great deal of faith in it, because he had yet to find a manufacturer who could produce the same thing twice in succession. When he joined the Post Office in 1927 there had been valves in use which after 25 years would still pass the original specification, but when the Post Office tried to buy some of these valves later it had been impossible to obtain them.

Sir Gordon Radley, who also replied, said that what caused kinking and buckling was the ship hanging around, as was sometimes necessary, with a couple of miles of cable dragging from it down to the bottom of the sea.

Birmingham Electric Club

Golden Jubilee Celebrations

ON 5th November, 1904, the Birmingham Electric Club, with an initial membership of seventeen, held its inaugural meeting. Last Friday the Club, now with a membership of 650 (limited only by practical considerations) celebrated its golden jubilee with a dinner at the Grand Hotel, attended by about 450 members and guests.

Responding to the toast of the City of Birmingham proposed by the Bishop of Birmingham, the Lord Mayor, Alderman J. R. Balmer, said that the Club met a great need and its activities, which in the past fifty years had included 300 lectures on a wide range of topics, were of great value to the city. Electricity played a big part in the lives of everyone and could help to solve the problem of atmospheric pollution. He wondered whether, with the development of atomic power stations, there might not be unlimited power available to everyone at fixed charges irrespective of use.

At the Birmingham Electric Club golden jubilee dinner: Mr. F. C. Fox, senior vice-president; the Lord Mayor of Birmingham, Alderman J. R. Balmer; Mr. H. M. Fricke, president; Lord Citrine; and Mr. G. Leslie Wates

Proposing the health of the Club, Lord Citrine, chairman of the British Electricity Authority, declared that from every point of view electricity was becoming more and more indispensable. He commented on the spirit of co-operation throughout all branches of the industry which now comprised over 900,000 engaged in manufacturing, supply and contracting. We were now coming to a period of unprecedented competition which could only be met by the greater use of electrical aids to production.

He was, however, very much concerned at the continuing shortage of generating plant. The Government had authorized for the next three years the commissioning of plant with an output capacity of 1½ million kW, but this target was not being attained. The steel shortage, which became particularly acute in 1952, had delayed construction work and he had pointed out to the Government two years ago that the commissioning of plant in the years 1953 and 1954 was bound to be seriously affected. In 1953, 1,413,000 kW had been commissioned, but it was now doubtful whether even that figure would be reached in 1954 since unexpected difficulties had been encountered.

The steel shortage had now been overcome and the year 1955 should see a considerable improvement in the amount of plant to be put into service. The Government had authorized the installation of 1,750,000 kW of plant in 1958, and this would rise, in subsequent years, to nearly 2,000,000 kW. The achievement of this target was well within the capacity of the manufacturing industry, and if this programme was realized it would put an end to power cuts.

Although he regarded the approach of winter with some anxiety, he was still hopeful that actual power cuts could be avoided if consumers generally, and domestic consumers in particular, used electricity discriminately during the peak periods. Much would depend upon the amount of plant that could be commissioned during the next two or three months, and in any case the Authority would have to keep in service every available kilowatt of plant, however obsolete, and exercise the greatest care to avoid breakdown and unnecessary outage. Where, however, breakdown did occur, it was imperative that the plant should be returned to service as quickly as possible. The volume of repair work, taken in conjunction with the maintenance of the export market and the commissioning of new plant at home, threw a great strain on the resources of the manufacturers, and as a means of helping to effect speedier repairs the British Electricity Authority was planning to establish its own central workshops in the Midlands and certain other Divisions.

Responding, Mr. H. M. Fricke, president of the Club, said the Club could justly claim to be the largest and oldest of its kind in the Empire. Its strength came from its broad based membership including men from all branches of the industry.

I.E.E. LIVERPOOL DINNER

ON Monday last the Mersey and North Wales Centre of the I.E.E. held its annual dinner at the Exchange Hotel, Liverpool, under the chairmanship of Mr. P. R. Dunn. After the chairman had proposed the toast of "The Queen, Duke of Lancaster," that of "The Institution of Electrical Engineers" was given by Mr. J. Duncan, part-time member of the Merseyside and North Wales Electricity Board and also a farmer. He said that economically we were doing many things which would have frightened the wits out of our grandfathers, but we were meeting with success. However, although the design and materials of our manufactured products were good, the workmanship was often inferior. This meant that more rigorous inspection was required. We should cut down our imports of farm produce since our foreign exchange must be reserved for industrial raw materials.

In reply, Mr. J. Eccles (President, I.E.E.) said that if we were to secure an acceptable existence we could not afford to be behind in either scientific knowledge or the ability to apply it. We must have scientific education and a properly organized scheme of practical training, otherwise we should be courting disaster. The teaching of science in our schools was suffering from lack of competent teachers, most likely because the remuneration and prospects of the teaching profession were much inferior to those in industry for trained scientists. This must not be allowed to continue and Mr. Eccles invited all education authorities to study the cause and if necessary substantially to increase the salaries of their science teachers. The line of promotion to the headmaster's chair should be open equally to science and arts teachers.

Mr. W. A. Hatch, past chairman of the Centre, then proposed the toast "Our Guests" and Mr. E. Bowyer (B.I.C.C.) briefly replied.

INDUSTRIAL NEWS

American Contract Secured

The United States Army Corps of Engineers have announced that the contract for two 68,000 h.p. (nominal) 128·6 r.p.m., vertical shaft, single runner, Francis type water turbines for the Table Rock Dam power station has been placed with the English Electric Export & Trading Co., Ltd.

The turbines are to be suitable for operating at heads of 134 to 228ft, the nominal head being 190ft. At 134ft head the output of each turbine is 44,000 h.p. and at 228ft it is 83,200 h.p. Delivery will begin in August, 1956, and the equipment is to be completed by September, 1957. The turbines will be made by the English Electric Co.

It is reported from Washington that the English Electric quotation, $1,066,662, was $145,000 below the nearest American tender. The price is said to include over $100,000 import duty.

In June this year the company made the lowest offer for two generators for the Chief Joseph Dam but the contract was awarded to the American Westinghouse Co. Earlier the company had been successful in its bid for a contract for two generators for the McNary Dam.

Engineering Wages Claims

It was decided at a meeting on 4th November of the Executive Council of the Confederation of Shipbuilding and Engineering Unions that the claim for an increase in the wages of engineering employees (from 10s to 15s a week) would be presented to the employers at a conference in London on 14th December.

On Wednesday last five trade unions, including the Amalgamated Engineering Union and the Electrical Trades Union, presented a claim for increases in the rates of pay of women workers in the engineering industry to the Engineering and Allied Employers' National Federation. They asked that the minimum rate for women should be not less than the present labourers' rate, 124s 10d a week; at present the women's rate is 97s 2d.

Southend Railway Electrification

A contract from British Railways for the supply and installation of overhead electrification equipment for an extension of the present Liverpool Street–Shenfield electric service as far as Chelmsford and Southend (Victoria), Essex, has been received by British Insulated Callender's Construction Co., Ltd. The contract is part of a £2,500,000 scheme, announced by British Railways last year. The extensions mean that a further 9½ miles of route will be electrified between Shenfield and Chelmsford and a further 21¼ miles between Shenfield and Southend (Victoria).

The overhead equipment will be generally similar to that installed on the section between Liverpool Street and Shenfield which was also supplied and installed by British Insulated Callender's Construction Co. It will operate at 1,500 V d.c. and, on the main track, will utilize a compound catenary system consisting of a hard-drawn copper strand as the main catenary, an auxiliary catenary supported by solid copper dropper wires and a grooved cadmium-copper contact wire suspended from the auxiliary catenary by loop droppers. The three wires will be jumpered together in every span and will provide a flexible system enabling trains to run at speeds of up to 70 m.p.h.

Industrial Atomic Power

The *A.E.I. News* for November says that the A.E.I. Group Research Departments have for many years been working on the problems of basic nuclear physics and the associated metallurgical problems that must be solved if nuclear power is to be applied successfully to industrial purposes. In the development of nuclear power stations, however, the boiler manufacturers also have an important part to play and accordingly Associated Electrical Industries, Ltd., has entered into an association with John Thompson, Ltd., of Wolverhampton, with a view to carrying out the necessary preliminary studies.

Under the leadership of Mr. S. A. Ghalib, formerly assistant chief engineer, Electronic Control Department, Metropolitan-Vickers, a team has been formed of mechanical, electrical and civil engineers, physicists and metallurgists drawn from Metropolitan-Vickers and the British Thomson-Houston Co., and from John Thompson's. The team will work in close association with the Atomic Energy Authority.

Opportunities for Contractors

Speaking at the annual luncheon of the Federation of Associations of Specialists and Sub-Contractors at the May Fair Hotel, London, last week, Mr. Frank Woodcock, the president, congratulated the principal guest, Mr. Harold Macmillan, Minister of Defence, who was until recently Minister of Housing, on securing the building of an average of over 300,000 houses a year. The improvement had not been at the expense of other forms of building. The abolition of licensing restrictions was another step in the right direction. It provided a further opportunity for increased output and should assist manufacturers to reduce costs. A start would, they hoped, soon be made on the problems of slum clearance and on reconditioning existing houses. The prosperity of the building industry was an important national asset and there were still needed measures which would encourage the provision of adequate reserves for replacements of machinery.

Mr. Macmillan said that a great deal of additional productivity had been got out of the industry and there was a sense of growing strength and expanding wealth. The abolition of licences had thrown new responsibilities on the industry and if we were to move forward we must depend on those who were not afraid to use their new freedom.

South African Tariff on Motors

The *Board of Trade Journal* reports that the Union Board of Trade and Industries, South Africa, has received representations for an increase in the rates of import duties on the following motors:—Three-phase from 1 to 1,500 h.p., squirrel-cage or slip-ring, protected, drip-proof or totally enclosed, and parts imported for local assembly. It is proposed that instead of duty-free entry under the minimum tariff there should be a 25 per cent *ad valorem* duty and that the rate under the intermediate tariff should be raised from 5 to 30 per cent *ad valorem*. British firms wishing to make representations against this proposal should get into touch immediately with their trade associations. Non-associated firms should communicate with the Commercial Relations and Exports Department, Board of Trade, Horse Guards Avenue, London, S.W.1, quoting reference C.R.E. 12231/54.

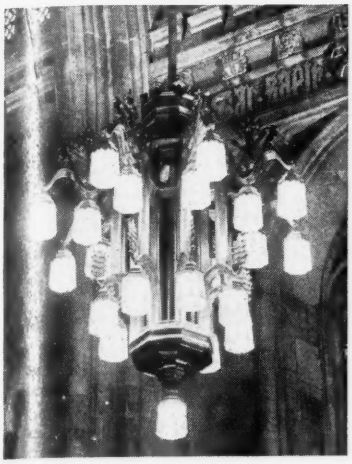
Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM Ingots	ton £156 0s 0d
COPPER, H.C. Electro	ton £275 0s 0d
Fire Refined 99·70%	ton £274 0s 0d
Fire Refined 99·50%	ton £273 0s 0d
COPPER Tubes ..	lb 2s 8¼d
Sheet	ton £339 5s 0d
H.C. wire and strip ..	ton £307 5s 0d
LEAD, English ..	ton £110 5s 0d
Foreign	ton £109 0s 0d
MERCURY	flask £110 0s 0d
TIN, block (English) ..	ton £723 0s 0d
ZINC, G.O.B. Foreign	ton £80 10s 0d
Electrolytic	ton £85 2s 6d
BRASS Tubes (solid drawn)	lb 2s 1⅞d
Sheet	ton £271 10s 0d
Wire	lb 2s 1⅝d
PHOSPHOR BRONZE Wire	lb 4s 1¾d
PLATINUM	oz £30 0s 0d
RUBBER, No. 1 R.S.S. spot	lb 26¼d–26½d

Lighting of the Guildhall

The eight bronze lighting fittings which form a handsome feature of the interior of the reconstructed banqueting hall at the Guildhall, London, were made at the Magnet Works, Birmingham, of the General Electric Co., Ltd., to the designs of the architect, Sir Giles Gilbert Scott. The old timber roof,



One of the eight G.E.C. lighting fittings installed in the reconstructed banqueting hall of the Guildhall, London

which was destroyed by fire during the war, has been replaced by a steel roof clad in timber, and the new fittings are suspended from the roof structure. They harmonize with the Gothic style of the building. Each fitting weighs approximately half a ton and measures 8ft 3in in overall height. The diameter measured through the tips of the upper circle of arms is 6ft 9in. The main lighting is by twenty-five 200 W lamps of which there are 16 in the upper tier, eight in the lower tier, and one in a decorative finial at the bottom of the fitting. Concealed lighting from four 60 W lamps at the top of the fitting is arranged to illuminate the ceiling.

The primary suspension consists of a 2⅜in diameter steel tube with plated bronze finish to match the fitting, and decorated with four ornaments. Each row of fittings is suspended from a rolled steel joist, to which the rods are attached by special cup mountings allowing limited movement. A stranded steel cable inside each tube forms the secondary suspension and the wiring is also accommodated in the tubes. Timber purlins conceal the connections of the suspension rods to the beams. The installation was carried out by the Alliance Electrical Co., Ltd.

Large Scale Electric Cooking

At the request of several of the Electricity Boards Miss Ester Purvis has revised and reprinted the booklet on "Large Scale Electric Cooking," first published in 1950. The main demand seems to be from those who are connected with school feeding centres, of which so many are now being electrically equipped. The booklet is obtainable from the Landwood Distributing Co., Ltd., 18, Cowcross Street, London, E.C.1, price 3s (quantity prices on request).

American Reactor Forecast

The *Electrical World* states that Mr. J. W. Landis, of the Babcock & Wilcox Co.'s Atomic Energy Division, announced in New York recently that within a year his company would probably be prepared to quote firm prices for nuclear reactors of the following types:—Light water moderated and cooled, slightly or highly enriched uranium; heavy water moderated, light water cooled, natural or slightly enriched uranium; heavy water moderated and cooled, natural or slightly enriched uranium.

Building Licensing Ended

The Minister of Works, Mr. Nigel Birch, stated in the House of Commons last week that as supplies of building materials had steadily improved during the last three years and productivity in the building and civil engineering industries had risen, the Government had decided to end building licensing by revoking Defence Regulation 56A on 10th November.

"Electronics at Work"

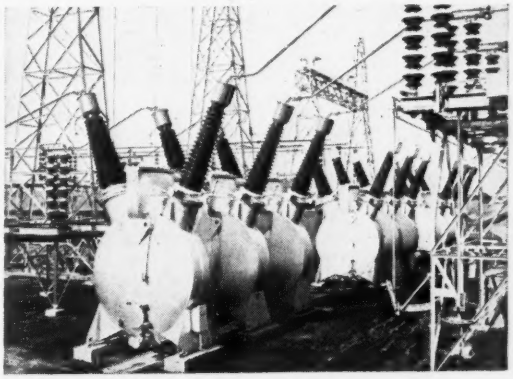
An exhibition under this title is taking place in Birmingham from 23rd to 25th November, supplanting the symposium normally held in London in alternate years. The exhibition is held under the auspices of the Scientific Instrument Manufacturers' Association and exhibits have been chosen to be of interest to those engaged in the main industries in the Midlands.

Physical Society Exhibition

The 1955 Physical Society Exhibition is to be held at the Royal Horticultural Hall, Westminster, from 25th to 28th April.

Switchgear at Yallourn

The accompanying photograph shows three of the first six B.T.H. 220 kV, 5,000 MVA, three-phase, "Shuntarc" oil circuit breakers erected at Yallourn power station, Victoria, Australia. Sixteen of these circuit breakers have been ordered by the State Electricity Commission of Victoria for installation at Yallourn. Extensive proving tests were carried out on the B.T.H. lenticular-tank "Shuntarc" circuit breaker at the Fontenay Testing Station of Electricité de France, including a series of tests to cover short circuit duty, line dropping, and transformer and reactor switching.



B.T.H. 220 kV, 5,000 MVA circuit breakers installed at the Yallourn station of the State Electricity Commission of Victoria

East African Radio Traders

The United Kingdom Trade Commissioner at Nairobi has reported the formation of the Radio Traders' Association of East Africa, P.O. Box 6742, Nairobi, Kenya.

Machine Tool Exhibition

The exhibition of F. Deckel and "Sparcatron" machine tools, factored in this country by Burton, Griffiths & Co., Ltd., which was to have been held last month at the London showrooms of the B.S.A. Tools Group (93, Albert Embankment, S.E.11), but was postponed because of the dock strike, will now be held from 22nd November to 4th December.

Fluorescent Lighting Handbook

As a practical help to the man "on the job" a booklet has been prepared by the Atlas Lighting Division of Thorn Electrical Industries dealing in simple terms with the fundamental principles of the fluorescent tube and tabulating a mass of useful data about tube colours, light output, tube life, etc. Other useful features deal with circuits and control gear, installations and servicing, fault finding, radio interference suppression and the selection of lighting fittings for a wide variety of purposes.

Complimentary copies of the handbook (Ref. AL/104C) are available from Thorn Electrical Industries Ltd., 233, Shaftesbury Avenue, London, W.C.2.

Works Visit

On 30th October about fifty members of the Mid-Warwickshire Branch of the Association of Mining Electrical and Mechanical Engineers visited the Rugby works of the British Thomson-Houston Co., Ltd., and toured various factories. In addition to heavy machinery the visitors saw transportable mining underground substations in various stages of manufacture, and a.c. and d.c. motors for colliery fans and

compressors. A motor-generator set for a 2,500 h.p. 2-rope friction winder was seen on the test bed. In the control gear factory the visitors saw various items of control gear for mine winders as well as considerable equipment for general industrial use. The guests were conducted round the works by members of the B.T.H. Mining Department and afterwards were entertained to tea.

Miniature Kitchen

To demonstrate the idea of mechanical kitchen units made to measure, and obtainable part by part, a miniature scale model kitchen is now on view at the London showrooms of H. Fisher (Oldham), Ltd., Lloyd House, Bryanston Street, London, W.1.

Covering a floor space of 8ft by 5ft, with an overall height of 3ft, it comprises a sink unit, washing machine, dishwasher, cooker, drying cabinet, refrigerator, ironer and other appliances. The company is willing to release the display for show purposes to any interested organization.

Contemporary Lighting Fittings

Encouraged by the success of its first standard range of contemporary lighting fittings, introduced three years ago, the General Electric Co., Ltd., has now added a further fifty fittings which can be seen in the company's new showroom at Magnet House, Kingsway. The majority have been designed by Beverley Pick Associates in collaboration with the G.E.C.

The new range includes ceiling fittings, pendants, wall brackets, floor and table standards and the lampshades are made of glass, "Chrysaline," spun aluminium, buckram and card, in shapes which vary from globes and dishes to cones and "diabolos." Materials such as straw, raffia and wickerwork have been avoided. Predominant colours, apart from black and white, are duck egg blue, peony, mustard yellow and cherry red.

One feature of the new range is of particular value to stores, shops and firms which specialize in display work. It includes sixteen aluminium spinnings which are available with a variety of standard accessories so that they can be hung from the ceiling or mounted on the wall in several different ways.

General view of the new G.E.C. contemporary lighting fittings showroom

Radioactive Batteries

A battery is described in the *Financial Times* dated 26th October, which uses 40 thermocouples to convert the heat produced by the radioactive decay of 150 curies of polonium. Developed by the Monsanto Chemicals Company in the United States, the battery will deliver 9·4 mW at a maximum current of 25 mA. Since the output of the polonium heater is 4·65 W, the working efficiency is 0·2 per cent. The polonium, which has a half-life of 138 days, is sealed in a silica aerogel inside a special container. The advantages of the battery are its small size and lightness, its operating life is dependent only on that of the radioactive material used, and, unlike an ordinary flashlamp battery, it is unaffected by extreme variations of temperature.

Trolley-Buses for Auckland

The above photograph shows the unloading at the docks at Auckland, New Zealand, of the first of the forty B.U.T. trolley-buses for Auckland which have been fitted with British Thomson-Houston electrical equipment. Several of these vehicles have already been shipped and it is hoped to complete shipment of the forty by the end of the year. The vehicles are fitted with the latest type of automatic acceleration equipment and will be the first modern trolley-buses equipped by the B.T.H. Co. to go into service in New Zealand.

The first of forty trolley-buses fitted with B.T.H. equipment being unloaded at the docks at Auckland

Nickel Alloy Works Jubilee

Viscount Weir of Eastwood, P.C., G.C.B., presided at a luncheon held on 5th November to celebrate the twenty-fifth anniversary of the founding in Glasgow of the Zenith Works of Henry Wiggin & Co., Ltd. Lord Weir obtained the concession to sell nickel-copper alloy in Great Britain and its initial development at the Cathcart Works of G. & J. Weir, Ltd., soon led to the setting up of a separate company, Monel Weir, Ltd. The Zenith Works, as the new factory was called, was officially opened in 1929. Soon afterwards the merger between the International Nickel Co. and the Mond Nickel Co. took place and Zenith Works became a department of Henry Wiggin & Co. In addition to Lord Weir, speakers at the luncheon were Sir Andrew McCance, deputy chairman of Colvilles, Ltd., Mr. A. B. Graham, director of Henry Wiggin & Co., Ltd., and Dr. J. F. Thompson, chairman of the International Nickel Co., Ltd.

D.S. Shuttered Sockets

By an unfortunate misprint in the advertisement of D.S. Plugs, Ltd., in our 15th October issue relating to shuttered sockets there appeared the phrase: "Minimum protection for easy wiring." The word "protection" should have been "projection."

Ideal Home Exhibition

The *Daily Mail* Ideal Home Exhibition, 1955, will be held at Olympia from 1st to 26th March next.

Trade Announcements

An ignition tester designed by the **English Electric Co., Ltd.,** for the rapid "televising" of ignition faults on motor cars, is to be marketed in future in the United Kingdom by Tecalemit, Ltd.

Ether, Ltd., Birmingham, has opened a London office at Stamford House, 2–4, Chiswick High Road, W.4 (telephone: Chiswick 7829 and 7949).

A.G.M. Electric Wholesale, Ltd., has changed its name to Mead Electric Wholesale, Ltd.

NEXT WEEK'S EVENTS

Organizers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 231, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged

Monday, 15th November

BIRMINGHAM.—Grand Hotel, Colmore Row, 6.15 p.m. Birmingham Electric Club. "Electrical Engineering in the Steel Tube Industry," by Major H. E. Knight.

CHESTER.—Town Hall, 6.30 p.m. I.E.E. Mersey and North Wales Centre. "The Technique and Development of Automatic Winding in Mine Shafts," by B. L. Metcalf and C. Cuttle.

IPSWICH.—Electric House, 7.30 p.m. Ipswich & District Electrical Association. "Electrical Installations in Ships," by E. L. Towle.

LONDON.—Savoy Place, 5.30 p.m. I.E.E. informal meeting. Discussion on "Has Nuclear Fission a Future as a Source of Industrial Power?" opened by Sir Harold Roxbee Cox.

NEWCASTLE-UPON-TYNE.—King's College, 6.15 p.m. I.E.E. North-Eastern Radio & Measurements Group. "Alternating-Current Instrument Testing Equipment," by Dr. A. H. M. Arnold.

Monday, 15th November, to Saturday, 20th November

LONDON.—Olympia. Public Works & Municipal Services Congress and Exhibition.

Tuesday, 16th November

CARDIFF.—At the South Wales Institute of Engineers, Park Place, 7.15 p.m. Incorporated Plant Engineers, South Wales Branch. "Instrumentation and Thermostatic Controls."

CHELMSFORD.—Public Library, 7 p.m. I.E.E. London Students' Section, district meeting. "Automatic Control of Electrical Machines," by R. Molloy.

GLASGOW.—The Grosvenor, 6 p.m. I.E.E. Scottish Centre Dinner-dance.

GLOUCESTER.—2, St. Aldate Street, 6.30 p.m. I.E.S. Gloucester & Cheltenham Centre. "Lighting for Enjoyment," by T. O. Freeth.

LEEDS.—1, Whitehall Road, 6.30 p.m. I.E.E. North Midland Centre. "Measurement of the Winding Resistances of a 132 kV Power Transformer in Service," by Dr. K. J. R. Wilkinson and J. D. Harmer.

LIVERPOOL.—9, The Temple, 24, Dale Street, 6.30 p.m. I.E.S. Liverpool Centre. "Lighting for Production," by J. W. Howell. (Joint meeting with the National Union of Manufacturers and the Federation of British Industries.)

LONDON.—Savoy Place, 2.30 p.m. Institution of Electrical Engineers. Celebration of the Jubilee of the Thermionic Valve.

Magnet House, Kingsway, 6.15 p.m. Association of Supervising Electrical Engineers. London National Lecture. "Application of Lifts for Modern Traffic Conditions," by W. A. Dixie. (Annual joint meeting with the Institution of Engineers-in-Charge.)

LOUGHBOROUGH.—The College, 7 p.m. I.E.E. East Midland Students' Section. "Servo Control," by P. J. Bhatt. (Joint meeting with the Students' Section of the Institution of Mechanical Engineers.)

MANCHESTER.—Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Utilization Group. Discussion on "Engineering Education—Can it be Improved?" opened by J. F. Yates.

RUGBY.—College of Technology & Arts, 6.30 p.m. I.E.E. Rugby Sub-Centre. "The Possibilities of a Cross-Channel Power Link between the British and French Supply Systems," by D. P. Sayers, M. E. Laborde and F. J. Lane.

Wednesday, 17th November

BELFAST.—College of Technology, 7.30 p.m. Belfast Association of Engineers. "Instruments and Automatic Control in the Boiler House," by S. R. Halsey and J. H. Whitaker.

BRADFORD.—Y.E.B., 45-53, Sunbridge Road, 6.15 p.m. I.E.S. Leeds Centre. "Industrial Colour-Matching Problems," by A. Wilcock.

CARDIFF.—College of Technology, Cathays Park, 6.30 p.m. British Institution of Radio Engineers, South Wales Section. "The Techniques of Power Measurements from d.c. to 5 Mc/s," by G. F. Lawrence.

FARNBOROUGH.—R.A.E. Technical College, 7.30 p.m. I.E.E. Southern Centre. "Maintenance and Operation of 132 kV Grid Supplies," by P. S. Vick.

LEEDS.—Hotel Metropole, 7.30 p.m. Institution of Heating and Ventilating Engineers, Yorkshire Branch. "Steam Boiler Operation, Inspection and Insurance," by W. A. Mills.

LONDON.—I.E.E. London Students' Section. Visit to Queen Mary College, High-Voltage Laboratory, Mile End Road, at 2 p.m.

MANCHESTER.—Engineers' Club, Albert Square, 7.30 p.m. A.S.E.E. Manchester Branch. "Industrial and Commercial Tariffs," by A. S. Verity.

MIDDLESBROUGH.—Cleveland Scientific & Technical Institute, Corporation Road, 6.30 p.m. I.E.S. Tees-Side Group. "Lighting Aids for Marine Navigation," by K. C. Sutton-Jones.

NEWCASTLE-UPON-TYNE.—Bolbec Hall, 6.45 p.m. North East Coast Institution of Engineers & Shipbuilders, Students' Section. "Constructional and Operational Notes on Turbo-Electric (T.2) Tankers," by D. Aris.

NOTTINGHAM.—E.M.E.B., Smithy Row, 7.30 p.m. A.S.E.E. Nottingham Branch. "The Practical Application of Rectifier Equipments," by A. R. Weston.

PRESTON.—N.W.E.B., 19, Friargate, 7.15 p.m. I.E.S. North Lancashire Group. "The Sense of Sight," by S. Mountain.

ROCHESTER.—Bull Hotel, 7 p.m. Incorporated Plant Engineers, Kent Branch. "Fan Characteristics with Particular Reference to their Application to Boiler Plant," by C. E. Knight.

SHEFFIELD.—Grand Hotel, 6.30 p.m. I.E.E. Sheffield Sub-Centre. "Safety in the Use of Portable and Transportable Electrical Equipment in Industry," by J. W. Bunting.

Grand Hotel. Incorporated Plant Engineers, Sheffield & District Branch. Annual dinner.

SOUTHAMPTON.—Polygon Hotel, 8.15 p.m. A.S.E.E. Southampton Branch. Technical films.

WIMBLEDON.—32, Worple Road, 8.15 p.m. A.S.E.E. South West London Branch. Lecturettes.

Wednesday, 17th and Thursday, 18th November

LONDON.—4, Grosvenor Gardens. Iron and Steel Institute. Autumn general meeting.

Thursday, 18th November

BLACKBURN.—Golden Lion Hotel, 7.30 p.m. Incorporated Plant Engineers, Blackburn Branch. "Gas Turbines," by J. R. Needham.

CARDIFF.—Institute Buildings, Park Place, 6 p.m. South Wales Institute of Engineers. William Menelaus Memorial Lecture: "Tidal Power, with Special Reference to the Severn Barrage," by Sir William Halcrow.

DUBLIN.—Trinity College, 6 p.m. I.E.E. Irish Branch. "Service Experience of the Effect of Corrosion on Steel-Cored-Aluminium Overhead-Line Conductors," by Dr. J. S. Forrest and J. M. Ward.

LONDON.—Savoy Place, 5.30 p.m. I.E.E. Utilization Section. "The Use of Electricity in the Production of Calcium Carbide," by C. J. Beavis.

MAIDSTONE.—Royal Star Hotel, 8 p.m. A.S.E.E. Kent Branch. "Relays," by Dr. W. L. Stern.

NOTTINGHAM.—Welbeck Hotel, 8 p.m. I.E.E. East Midland Centre. Buffet dance.

WATFORD.—Clarendon Hotel, Station Road, 8 p.m. A.S.E.E. Watford Branch. "Television."

Friday, 19th November

DERBY.—Grandstand Hotel. Derby Electrical Society. Annual dinner.

LEEDS.—Queen's Hotel, 7 for 7.30 p.m. I.E.E. North Midland Centre. Annual dinner.

LONDON.—Bush House Restaurant, Aldwych. Institution of Heating and Ventilating Engineers, London & District Associate Members' & Graduates' Section. Ladies' evening and dinner-dance.

Savoy Hotel, 6.30 p.m. Association of Electrical Machinery Trades. Annual dinner and dance.

Feathers Hotel, Broadway, Westminster, S.W.1, 6 p.m. Electrical Trades' Commercial Travellers' Association. Annual general meeting.

MANCHESTER.—Grand Hotel. Incorporated Plant Engineers, Manchester Branch. Annual dinner.

NEWCASTLE-UPON-TYNE.—King's College, 6.30 p.m. I.E.E. North Eastern Students' Section, Tyneside meeting. "D.c. Auxiliary Supplies for Switchgear and Associated Equipment," by J. T. Miller.

NOTTINGHAM.—Black Boy Hotel. Incorporated Plant Engineers, East Midlands Branch. Ladies' evening.

PRESTON.—County Hall. Institution of Heating and Ventilating Engineers, Manchester & District Branch. "Radiant Heating," by A. Bates.

Saturday, 20th November

CAMBRIDGE.—Dorothy Restaurant, 7 p.m. I.E.E. Cambridge Radio Group. Cambridge district dinner.

LONDON.—I.E.E. London Students' Section. Visit to British Thomson-Houston Co., Ltd., Willesden, at 10 a.m.

STREET LIGHTING PLANS

LIVERPOOL City Lighting Department (engineer Mr. C. C. Smith) in the coming year intends to make a start on a £600,000 scheme to erect 15,000 electric lamps to replace 11,000 gas lamps. The work will take fifteen years to complete and will be tackled in stages. According to the chairman of the Lighting Committee, service lines on new housing estates are averaging £14 per lamp position, as against £3 paid before nationalization.

LEAMINGTON SPA Town Council has approved a scheme for the conversion of lighting in Cubbington Road to electricity.

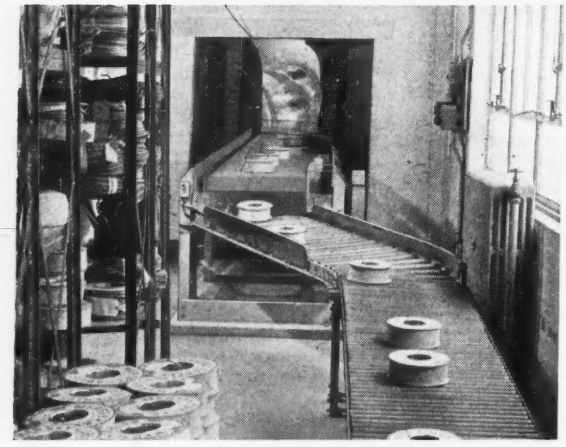
CLACTON U.D.C. is to change the lighting in three streets from gas to electricity, using post top lanterns with 80 W mercury fluorescent type lamps, at an estimated cost of £1,200.

A new street lighting scheme for BRIGG (Lincs.), covering Bridge Srreet, Market Place, Wrawby Street and Wrawby Road, is estimated to cost £5,170.

Plans are being prepared for further conversions from gas to electric street lighting at STAMFORD.

The SKIPTON Public Works Committee recommends that the Urban District Council should proceed with the conversion of street lamps from gas to electricity.

The section of the test room dealing with small flexible cables



Band conveyors carry the lighter types of cable from the test department to the stores on the top floor seen above. Below: Orders are made up on pallets for transfer by lift to the packing department

Cable Manufacturers'

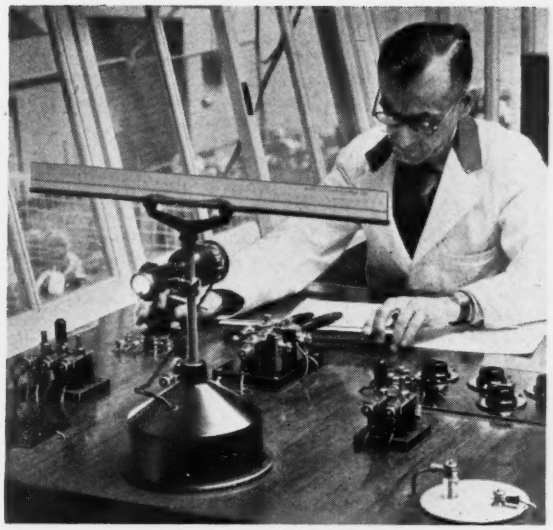
NEW PHASE IN MERSEY COMPANY'S

THE completion of a new storage, packing and dispatch block marks a further stage in the expansion and modernization of the production facilities of the Mersey Cable Works, Ltd., in Linacre Lane, Bootle. The new block, a three-storey building with basement, provides an additional 120,000 sq ft of floor area. In view of the limitation in storage space imposed by the site, the roof has been specially strengthened to permit the storage of drums. Cables are stored on both top and first floors, the latter also being equipped for packing and for segregating home and export orders. On the ground floor are a fitting shop and the general dispatch department, the basement being used for the storage of raw materials.

Band conveyors carry the lighter types of completed cables from the test department in the main factory to the top of the new block where they are placed in appropriate racks. Here orders are made up on pallets which are taken on trolleys to lifts for transfer to the packing department. These lifts are also used for carrying the heavier types of cable between ground floor and the packing department.

The availability of the new building permits a large-scale reorganization of production and a complete re-layout of about half of the factory. Part of this modernization scheme has already been carried out with the conversion of the old dispatch stores into a new test room. This doubles the testing facilities, the arrangements adopted also adding greatly to the convenience of handling.

The test room has been divided into two halves, one for dealing with the standard medium voltage cable and the other with heavy industrial and other special types. A gallery constructed over the centre of the room accommodates six glass-partitioned cubicles four of which form the test rooms and are equipped with the latest test instruments. Heavy flexible cables connect these cubicles with the cables to be tested on the benches below and, while the test engineers can see through the windows



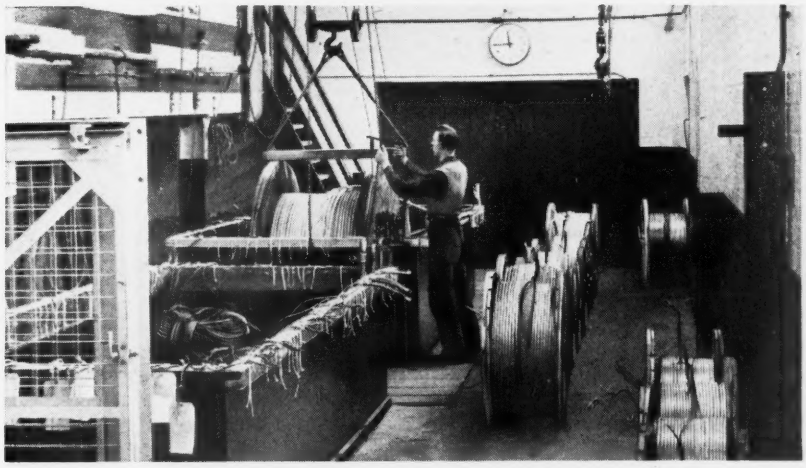
Left: The new dispatch bay. Right: Glass partitioned cubicle equipped with the latest instruments overlooking the test room

Expansion

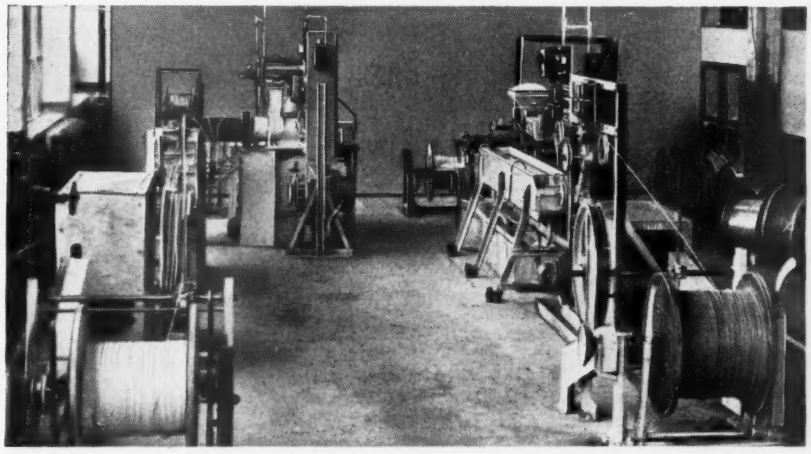
DEVELOPMENT

all that is going on beneath, they themselves work in secluded quiet conditions. A buzzer system is employed to communicate between the test engineers and the operators working on the benches below. As already mentioned, there is a conveyor system from the test room to the stores. Mechanization is being extended to bring cables into the test room from the final manufacturing process.

The additional space made available for production by the reorganization has been devoted largely to meeting the increasing demand for plastic insulated and sheathed cables in which the company has carried out a great deal of development work. The change-over from rubber to plastics imposes a certain amount of difficulty in a general purpose factory such as this, if production is to be maintained. Accordingly the conversion has had to be carried out gradually as circumstances permit. Eventually, when the superimposition of the new methods has been completed, there will be separate flow lines for all the main types of cables.



Above: Section of the test room dealing with heavy industrial and special types of cable. Below: One of the first steps in the rearrangement of the factory to meet present-day requirements has been the re-siting of the plastics extrusion machines in a separate department. Two of the smaller of these machines are here shown in their new position



Financial Section

STOCKS and SHARES

THERE has again been little evidence in the Stock Exchange of any change in the firm trend of prices. Market Cassandras have had scant encouragement from the economic news, or from individual company announcements. It becomes freely admitted that many industrial share prices are now based more on the rates of dividend expected for the current year than on the last actual payments; but confidence in this respect is being fed by a succession of significant increases in interim dividend declarations. Matters have been helped by a noticeable revival of prices in the gilt-edged market.

Price Changes

Ward & Goldstone £1 shares were marked up 3s to 42s 6d on the declaration of a 10 per cent interim dividend. Allowing for the 100 per cent scrip issue, this represents a 2½ per cent increase on last year's dividend. Burco's total dividend of 25 per cent is also payable on double last year's capital and is effectively 7½ per cent more than before. Southern Areas have again been prominent, rising a further 3s 9d to 31s 3d, and Aron Meters scored a similar gain to 60s. Laurence Scotts have been changing hands at 26s 3d, showing a florin rise. B.E.T. advanced with vigour to 70s, and others showing improvements of 1s or more included Siemens, Murex, Metal Industries and R. A. Lister. After their activity around the time of the dividend declaration, Crompton Parkinsons were a trifle reactionary.

Elliott Brothers

Activity, at rising prices, has developed recently in the 5s ordinary shares of Elliott Brothers (London). Starting this year at about 20s, they stood at almost double that figure after last month's announcement of a 7 per cent interim dividend and of a proposed one-for-two scrip issue. They jumped a further 5s to 44s 6d following reports that the company is starting a service for the hire of its electronic computing machines. For last year the company earned £91,000, after tax, and paid a 20 per cent dividend on the £308,000 ordinary capital.

Brush Interim

The Brush Group's declaration of a 3 per cent interim dividend on account of this year was not read as a pointer of much significance to the likely total, and produced little change in the price of the 5s shares. For last year a single payment of 6 per cent was declared in March, and in the three years up to 1951, before the accounts were affected by the Indian tube-well losses, the company was paying interims of 4 per cent, followed by finals of 6 per cent. The present price of 8s 3d for the ordinary shares compares with a quotation under 6s at the time, early this year, when Thos. Tillings announced the acquisition of

The Week's Price Changes

Company or Board	Nom. Value	Middle price 8th Nov.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield % £ s d	1954 Highest	1954 Lowest
Gilt-edged Stocks								
Brit. Elec. 1968/73	100	97	+½	3	3	3 1 9	97	88⅝
Brit Elec. 1974/77	100	95½		3	3	3 2 9	96½	87½
Brit. Elec. 1976/79	100	100½		3½	3½	3 9 8	101½	93⅜
Brit. Elec. 1974/79	100	111	+1	4¼	4¼	3 16 6	111½	103⅛
Overseas Electric Supply								
Calcutta Elec.	£1	22/6		6†	6†	5 6 8†	24/6	18/7
East African Power	£1	23/-		7	7	6 1 9	23/4	19/6
Nigerian Elec.	£1	24/-		10	10	8 6 8	25/-	23/6
Palestine Elec. "A"	£1	21/-		Nil	Nil	—	21/-	16/-
Perak Hydro-Elec.	£1	18/-		6	10	11 2 0	20/-	13/9
Equipment and Manufacturing								
Aberdare Cables	5/-	13/9	+9d	25	12½*	4 11 0	13/9	8/1
Aerialite	1/-	14/6		88½	88½	6 1 9	14/6	10/9
Allen, W. H.	£1	77/-		15	20	5 4 0	77/-	50/-
Aron Elec. Ord.	£1	60/-	+3/9	20	15	5 0 0	60/-	43/-
Assoc. Elec. Ord.	£1	62/6		20	11½*	3 12 0	62/6	41/6
Automatic Tel. & El.	£1	71/3		15	15	—	73/-	57/3
Babcock & Wilcox	£1	75/3	−1/-	18	12*	3 3 10	76/3	47/3
Baldwin, H. J.	2/-	5/-		20	20	8 0 0	5/6	3/9
Bakelite	10/-	30/9xd		12½	12½	4 1 4	31/3	23/6
British Aluminium	£1	39/9		12	10	5 0 9	40/-	33/9
B.I. Callender's	£1	52/-	+6d	10	10	3 17 0	52/-	37/9
B.I. Callender's 6% Pref.	£1	26/3	+3d	6	6	4 11 6	26/6	24/3
British Thermostat	5/-	27/6	+1/3	35	27½*	—	28/-	12/-
British Vac. Cleaner	5/-	13/6	+6d	25	25	9 5 3	14/6	11/6
Brook Motors	10/-	45/6		20	20*	—	45/6	29/3
Brush Ord.	5/-	8/3	+3d	4	6	3 12 9	8/3	3/6
Bulgin, A. F.	1/-	3/9		30	30	8 0 0	3/9	3/2
Burco	5/-	19/9	+6d	35	25*	6 6 7	19/9	12/1
Chloride El. Storage	£1	67/6	+3d	20	12½*	3 14 0	68/6	46/6
Clarke Chapman	£1	67/-	+2/-	17½	20	—	73/-	47/6
Cole, E. K.	5/-	18/9		25	27½	—	19/6	11/6
Cossor, A. C.	5/-	9/9		10	10	5 2 6	11/-	7/-
Crabtree	10/-	30/-xd		17½	20	6 13 4	30/6	23/9
Crompton Parkinson Ord.	5/-	20/6	−1/-	20	20	4 17 7	22/-	14/-
De La Rue	5/-	19/3	+1/-	Nil	20	5 4 0	21/-	12/3
Decca	4/-	51/3xr	+1/9	150	35*	—	51/3	32/-
Desoutter	5/-	23/9		18	20	4 4 3	23/9	16/1
Dewhurst	2/-	7/-		19	19	5 8 6	7/-	5/1
Dictograph Tel	2/-	7/-		20	20*	6 3 0	8/-	5/2
Dubilier Condenser	1/-	4/4½		25	25	—	5/3	3/3
E.M.I.	10/-	19/9xd	+9d	12	8	4 1 0	23/-	11/3
Electrical Components	5/-	16/3		20	20	6 3 0	16/3	10/9
Elec. Construction	£1	68/9	+1/3	15	15	4 7 3	68/9	53/-
Enfield Cable Ord.	£1	23/9	+6d	5	Nil	Nil	25/9	16/6
English Electric	£1	54/-	−1/-	15	10*	3 14 0	59/-	38/-
English Electric 3½% Pref.	£1	16/9		3½	3½	4 9 7	16/9	15/3
Ericsson Tel.	5/-	32/9	−3d	22†	25†	1 18 3*	33/9	22/9
Ever Ready	5/-	26/-xd		35	40	—	26/3	17/9
Falk Stadelmann	£1	42/-		15	15	7 2 10	42/6	36/6
G.E.C Ord.	£1	60/-	+1/3	11½	12½	4 3 4	60/-	37/6
G.E.C. 6½% Pref.	£1	27/6		6½	6½	4 14 6	27/6	26/6
General Cables	5/-	17/9	+6d	30	30	8 9 0	18/-	16/3
Greenwood & Batley	£1	51/3		17½	17½	6 16 6	51/3	40/3
Hackbridge Cable	5/-	14/9		20	20	6 15 6	15/9	11/3
Hackbridge & Hewittic	5/-	25/-		20	25	5 0 0	25/-	16/10
Hall Tel. Acc.	10/-	12/-		10	10	8 6 8	13/-	10/6
Heatrae	2/-	5/6		12½	12½	4 11 0	5/6	4/-
Henley's	10/-	20/6		10½	10½	5 2 5	22/-	15/6
Holophane	5/-	17/6		20	25	7 2 9	17/6	13/1

* After capital bonus. † Free of income tax.

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.

two million shares from Associated British Engineering.

T.I. Dividend

In raising the total ordinary dividend for 1953/54 from 15 to 17½ per cent, Tube Investments do not depart from the conservative distribution policy which always contributed largely to the financing of the group's expansion. According to the preliminary profits statement, the trading profit for the twelve months to July last is up from £7·5 to £7·7 million, and although increased provisions reduce the net surplus to a little below the previous figure, it still covers the amount of the ordinary distribution some three-and-a-half times over. These results came up to market expectations, and the price of the £1 shares remained steady at 76s 3d. The yield of under 4½ per cent denotes their high investment ranking.

in Electrical Investments

Company or Board	Nom. Value	Middle price 8th Nov.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1954 Highest	1954 Lowest
Equipment and Manufacturing—continued.						£ s d		
Hoover	5/-	45/-	−2/6	25	45	4 18 10	51/-	26/3
I.C.I.	£1	41/9	−9d	13	15	3 11 9*	43/6	26/6
Intl. Combustion	5/-	28/-	−6d	15	20	3 11 5	30/-	14/6
Johnson & Phillips	£1	47/3		15	15	6 7 0	52/6	47/6
Lancashire Dynamo	£1	56/3		12½	14	4 19 6	59/6	43/-
Laurence, Scott	5/-	26/3	+2/-	15	20	3 17 3	26/6	14/-
Lister, R. A.	£1	33/-	+2/-	9	12	—	33/-	22/6
London Elec. Wire	£1	53/9		15	10*	3 14 6	54/-	38/-
Lucas, J.	£1	46/3	−1/3	9½	10⅝	—	49/-	25/3
Marryat & Scott	2/-	8/3		22½	25	6 1 3	8/3	5/11
Mather & Platt	£1	52/6	−6d	12½	15	—	53/-	32/-
Metal Industries	£1	34/6	+1/3	12	9	5 4 4	42/3	29/6
Midland Elec. Mfg.	£1	75/-		15	15	4 0 0	75/-	63/-
Morphy-Richards	4/-	25/6		40	35*	5 9 10	26/-	11/4
Murex	£1	52/-	+1/6	15	15	5 15 6	57/-	49/-
Newman Ind.	2/-	2/4½		10	10	8 8 5	2/6	2/-
Oldham & Son	1/-	3/-		17½	17½	5 16 8	3/4	2/5
Parnall (Yate)	5/-	10/6	−3d	6	8	3 10 2	11/-	4/3
Parsons, C. A.	£1	55/-		12½*	7½*	2 14 6	60/-	38/1
Plessey	10/-	57/-		25	30	—	58/9	37/10
Pye Deferred	5/-	36/9	+3/3	20	20*	2 14 4	37/-	15/7
Revo	10/-	14/6		27½	9*	6 4 6	20/3	14/-
Reyrolle	£1	90/-		12½	13¾	3 1 0	92/6	66/-
Rheostatic	4/-	15/-		19	20	5 6 8	15/9	11/-
Richardsons Westgarth	5/-	11/9		15	15*	6 7 8	12/3	6/6
Scottish Cables	4/-	19/9	−3d	20	27½	5 11 3	21/9	12/1
Siemens Ord.	£1	36/	+1/3	10	10	5 11 0	43/9	33/9
Smith (England), S.	4/-	14/6		12½	15	—	15/-	7/8
Southern Areas	£1	31/3	+3/9	6-	7½	4 16 0	31/3	17/6
Strand Elec.	5/-	9/9	+6d	17½	17½	8 19 6	9/9	8/3
Sturtevant	5/-	22/9xc		18·1†	18·9*†	—	22/9	14/6
Sun. Elec.	£1	33/9		15	15	8 17 9	33/9	27/6
Switchgear & Cowans	5/-	12/-		22½	10	4 3 4	13/7	9/9
Taylor Tunnicliff	5/-	11/-		25	12½*	5 13 9	12/4	10/7
T.C.C.	10/-	37/6		20	30*	—	37/6	21/3
T.C. & M.	£1	33/6		10	8½*	5 1 6	34/6	30/3
Telephone Mfg.	5/-	9/6		10	10	5 5 3	9/6	7/6
Thorn Elec.	5/-	28/-	+6d	12½	20	3 11 5	28/-	13/3
Thornycroft	£1	49/-xd		15	15	6 2 6	50/-	33/4
Tube Investments	£1	76/3		15	17½	4 11 9	79/9	60/3
Vactric	5/-	18/-		Nil	10	2 15 6	18/9	7/6
Veritys	5/-	10/-		10	12½	6 5 0	10/-	5/-
Walsall Conduits	4/-	51/3		70	70	5 9 4	52/6	44/-
Ward & Goldstone	5/-	42/6	+3/-	45	50	—	43/-	21/-
Watford	2/-	6/6		25	22½*	—	7/3	4/7
Westinghouse Brake	£1	82/6	+1/9	15	16	3 17 8	83/-	60/9
West, Allen	5/-	19/6		15	17½	4 9 0	19/6	12/7
Wolf Electric	5/-	17/6		15	17½	5 0 0	17/6	11/-
Trusts, Transport and Communications								
Anglo-Am Tel.:								
A Ord.	100	88		6	6	6 16 4	89½	80
Ord.	100	54½		3¾	3¾	6 17 6	55½	52
Anglo-Portuguese	£1	25/3		—	8	6 6 9	25/9	21/-
Brit. Elec Traction:								
Def. Ord.	5/-	70/-xd	+2/9	35	50	3 11 5	72/-	39/1
Cable & Wireless:								
Ord.	£1	42/-		8	9	4 5 9	49/6	26/2
4% Loan	100	98½		4	4½	4 1 3	98½	95½
Calcutta Trams	£1	21/6		2½†	6†	5 11 6†	24/6	17/1
Cape Elec. Trams	£1	15/6		5½	7	9 13 6	17/6	12/4
Marconi Marine	£1	32/6		10	10	6 3 0	35/-	27/6
Oriental Tel. Ord.	£1	97/6	−1/3	16	16	—	99/1	82/6
Telephone Props.	£1	92/6		—	—	—	92/6	74/6
Telephone Rentals	5/-	10/6	+3d	10	10	4 15 3	10/6	9/-

Railway Equipment

A Stock Exchange firm specializing in the shares of electrical and other engineering enterprises has produced a brochure based on the Minister of Transport's recent references to plans for the re-equipment and modernization of the railways. No figures have of course yet been officially mentioned, but the firm tentatively envisages a figure of £500 million, spread over ten years and embracing large expenditure on electrification and signalling systems, as well as on rolling stock, permanent way, etc. Margins of profit are not likely to be generous, they suggest, but the volume of work could be heavy and prolonged.

Hydro-Electric Issue

The North of Scotland Hydro-Electric Board made an issue last week of £25 million 3½ per cent stock, redeemable 1977/80, at 100. Dealings are now in progress at about that figure. Guaranteed as to principal and interest by the Treasury, it ranks as a full trustee stock and stands accordingly on a level with comparable British Government issues. Terms of this issue illustrate in an interesting way the change which has come over borrowing conditions since the Chancellor began, a little over a year ago, to relax the hard money policy, for it was only in March of last year that this Board issued stock bearing 4 per cent interest, and at a price as much as 11 points below its present quotation of 107.

Canadian Trade Fair

The 8th Canadian International Trade Fair, sponsored by the Canadian Government, will be held in Toronto from 30th May to 10th June, 1955. Continuing the policy of developing new trade sections, the 1955 Canadian International Trade Fair will include a comprehensive welding and metals section. A section that shows promise of developing beyond the scope of previous years is that containing heavy industrial electrical equipment. At the end of September more than 33,000 sq ft of space had been booked by exhibitors from eight countries. The largest single trade category so far is machine tools, followed closely by plant equipment. Countries booked to date, in order of exhibit space, are Canada, United Kingdom, the United States, Denmark, Ireland, Norway, Germany and Sweden.

REPORTS and DIVIDENDS

Tube Investments, Ltd.—The trading profits of the subsidiary companies for the year to 31st July last (subject to final audit) amount to £7,685,666, as compared with £7,458,583 for the preceding year. Depreciation absorbs £1,943,842, and other income totals £260,407. After providing £3,301,195 for taxation, the net group profit is £2,687,484 (against £2,720,172), to which is added £86,640, taxation settlements of previous years, making £2,774,124 available. Of this £319,064 is retained by subsidiaries and £1,500,000 is placed to general reserves. It is proposed to pay a final ordinary dividend of 10 per cent (against 7½ per cent), making 17½ per cent for the year (against 15 per cent). The increase in carry forward is £101,848.

J. & F. Stone Lighting & Radio, Ltd.—The annual meeting will be held on 24th November. In his circulated statement, Mr. D. G. Nairn (chairman) says that when they last met, they had experienced a year during which the group earned a record profit to which major contributions had been made by the Coronation and by the harvesting of a peak investment in hire purchase made in earlier years. The increased profits for the year under review have been achieved without these aids. They have commenced the current year with the reasonable anticipation that turnover and trading results will continue to make satisfactory progress. With the removal of hire purchase restrictions they are able, out of their own resources, to extend the facilities of hire purchase for which they are extensively organized.

Stothert & Pitt, Ltd.—The annual meeting was held on 3rd November. In the course of his speech, Sir Llewellyn T. G. Soulsby (chairman) said that the trading profits and sales both reached an all-time record whilst the proportion of sales to the export markets was satisfactory. Competition in both the home and export markets was greater than it was twelve months ago and there was a narrower margin between profit and loss. During the current financial year they had obtained important contracts for various markets abroad. The Australian company had a record year whilst deliveries to Canada were the best for many years. The order book had had an export ratio of nearly 45 per cent.

Falk, Stadelmann & Co., Ltd., report a group profit for the year to 31st March last of £536,809, as compared with £400,156 for the preceding year, and with other income the total is £556,829. From this is deducted depreciation £99,034, executive and managerial remuneration £92,973, and taxation £211,466. After minority interest and retentions by subsidiaries the net profit is £92,037 (against £56,795). It is proposed to pay a final dividend of 5 per cent, making 15 per cent for the year (unchanged), and the balance carried forward in the parent company is £89,245 (£75,094). The group carry-forward is £276,834 (£210,728).

Perak River Hydro Electric Power Co., Ltd.—The annual meeting was held on 5th November. In his circulated statement Mr. H. G. Balfour (chairman) said that the system maximum load during the year under review was 64,000 kW, an increase of 5,000 kW over the previous year, and the sales of electricity increased from 320·5 million kWh to 335·1 million. Returns for the current year to date were satisfactory.

The Globe Telegraph and Trust Co., Ltd., is to issue the balance of the authorized capital of 1,117,799 ordinary shares of £1 each, of which 1,109,200 will be offered for subscription by way of rights at £1 per share to holders of the ordinary stock in the proportion of two ordinary shares for each £7 of ordinary stock held. The remaining ordinary shares, together with any such shares in respect of which stockholders or their nominees fail to exercise their rights, will be sold for the benefit of the company, the brokers having guaranteed a minimum price of 20s per share. The ordinary shares will not entitle holders to participate in any interim dividend which may be declared in respect of the current financial year but will otherwise rank *pari passu* with the existing ordinary stock. The consent of the Treasury has been obtained to the issue. The directors propose to convert the new shares, when fully paid, into ordinary stock transferable in units of 5s each and to arrange, at the same time, for the existing ordinary stock to be transferable in similar units.

Yarrow & Co., Ltd.—The group net profit for the year to 30th June last is £143,900, as compared with £105,544 for 1952–53. Provision for taxation amounts to £251,000. It is proposed to pay a dividend of 17½ per cent for the year on capital increased by a free scrip issue of one for two. This compares with 20 per cent for the previous year on the old capital. General reserve receives £50,000.

The Brush Group, Ltd., formerly the Brush Electrical Engineering Co., Ltd., is resuming interim dividends on the ordinary stock with a payment of 3 per cent. For 1953 a single payment of 6 per cent was made.

Burco, Ltd., reports a profit for the year ended 30th September last, after providing £112,741 for taxation, of £101,898, as compared with £62,560 for the previous year. It is proposed to pay a final dividend of 17½ per cent, making 25 per cent for the year on doubled capital. The total distribution for the previous year on the old capital was 35 per cent.

Ward & Goldstone, Ltd., have declared an interim dividend of 10 per cent (against 15 per cent) on doubled capital.

Meters, Ltd., has declared an interim dividend of 5 per cent (against 4 per cent). The increase does not imply an increase in the final dividend.

G. & J. Weir, Ltd., are paying an interim dividend of 7½ per cent (against 5 per cent).

T. Clarke & Co., Ltd., propose to make a two-for-seven rights issue at 4s per share.

W. & T. Avery, Ltd., have declared an interim dividend of 5 per cent (unchanged) on capital increased by a 60 per cent scrip issue.

Heenan & Froude, Ltd., report group net profits of £395,657 for the year ended 28th August last, as compared with £367,113 for the preceding year. Taxation requires £228,429, and the net surplus is £167,199 (against £153,278). General reserve receives £100,000, and it is proposed to pay a final dividend of 12½ per cent (against 10 per cent), making 17½ per cent for the year (against 15 per cent).

New Companies

Fans & Spares, Ltd.—Registered 21st October. Capital £1,000. Manufacturers and dealers in fans of all kinds, etc. Permanent directors: A. D. Wood, Miss E. M. Ellson, Florence Wood and David H. Wood. Regd. office: 39–41, Constitution Hill, Birmingham.

Threestoks, Ltd.—Registered 21st October. Capital £100. Electrical and mechanical engineers and contractors etc. Directors: A. E. Stokes and J. F. Stokes. Secretary: J. F. Stokes. Regd. office: 51a, Victoria Park Road, E.9.

Rad-Fire, Ltd.—Registered 21st October. Capital £250. To acquire an interest in British Patent No. 636,942 and any other patents, brevets d'invention and the like; and to carry on the business of manufacturers of and dealers in electrical, gas and oil fires, fittings, appliances etc. Directors: H. V. Tooley, Christina Tooley and E. E. B. Vereker. Secretary: Christina Tooley. Registered office: 43, Trinity Square, Margate, Kent.

H. Wilkinson & Sons (Electrical), Ltd.—Registered 19th October. Capital £2,000. Electrical engineers and general electrical installation contractors, wireless and television engineers, etc. Permanent directors: H. Wilkinson, F. Wilkinson, G. Wilkinson, W. Wilkinson and A. Wilkinson. Secretary: H. Wilkinson. Registered office: 56a, Cold Bath Road, Harrogate.

Bankruptcies

G. S. Graham, Blackfriars Street, Carlisle, electrical engineer.—Trustee, Mr. D. Atkinson, 14, Lowther Street, Carlisle, Official Receiver, released 26th October, 1954.

H. Tansey, residing and lately carrying on business at 53, Hollydale Road, Erdington, Birmingham, 24, electrical contractor.—Last day for receiving proofs for dividend 13th November. Trustee, Mr. R. K. Clark, Somerset House, 37, Temple Street, Birmingham, 2, Official Receiver.

F. H. Pountney, trading as "Bordesley Electrical Co.", 164, High Street, Bordesley, Birmingham, electrical engineer.—Supplemental dividend of 2s 3½d in the £, payable on and after 18th November at the Official Receiver's office, Somerset House, 37, Temple Street, Birmingham, 2.

B. T. Smith, The Studio, Ramsgate, Louth, Lincs., electrical engineer and contractor.—First and final dividend of 3¼d in the £, payable on and after 16th November at 26, South Saint Mary's Gate, Grimsby.

F. E. L. Hester, Ferndale, Meadowcroft, Blacon, near Chester, formerly carrying on business at 9, Coal Exchange, Black Diamond Street, Chester, electrical contractor.—Trustee, Mr. A. K. Ferguson, West Africa House, 25, Water Street, Liverpool, 2, Official Receiver, released 29th October.

J. H. Trevithick, electrician, a partner in the firm of Power, Light & Sound, 51, Fore Street, Callington, Cornwall.—Last day for receiving proofs for dividend, 19th November. Trustee, Mr. F. B. Goodman, 24, Lockyer Street, Plymouth, Official Receiver.

MARTINDALE

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"JIFF-V"

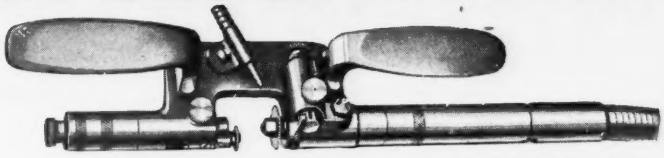
Mica Undercutting by the use of files (and "sweat") has always been regarded as a method productive of satisfactory results.

The Universal Motor driven JIFF-V Undercutter gives a similar clean "V" or "U" slot in a "Jiffy," and eliminates the hard and tedious work.

The high-speed file is easy to guide, and permits cutting clear up to the commutator risers.

Can be used on commutators of all sizes above 4" diameter, without removing the Brush Arms.

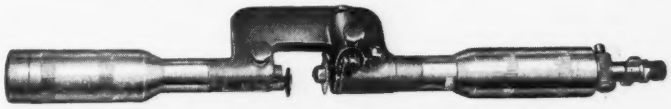
Also available with "U" cutters.



IMPERIAL Electric UNDERCUTTER

is for fast efficient "V" or "U" slotting and alternative heads and handpieces can be used for driving rotary burrs, files, mounted grinding points, polishing mops, wire brushes, sanding discs, etc.

A most efficient electric machine for both portable and shop use for commutators 6" diameter and upwards.



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is basically the same construction as the Imperial but is driven by a sturdy high-speed air motor operating at about 100 lbs. per sq. inch.

Whatever your requirements there is a suitable Martindale Undercutter to give satisfactory results

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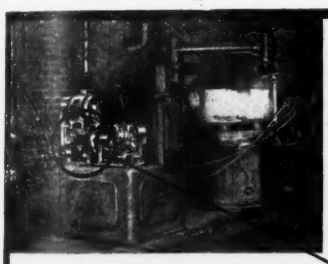
Telephone: COLindale 8642/3 Telegrams: "Commstones, London" [redacted] also at 25 Elmbank Street, Glasgow, C.2



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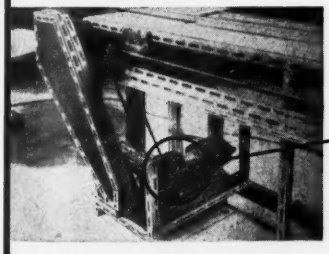

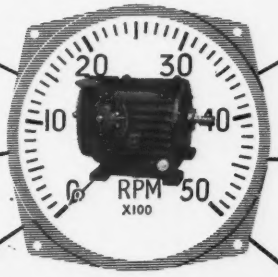

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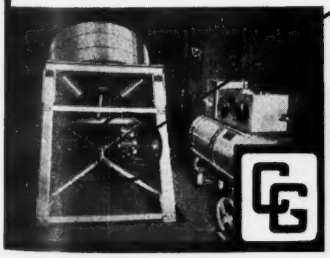

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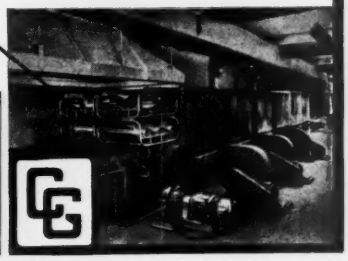
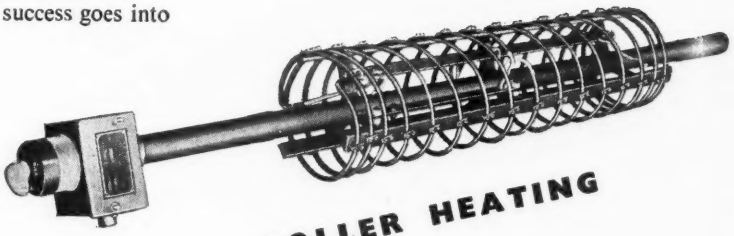


Making things hot for industry

When it's a question of quick, efficient heating the Metrovick tubular-sheathed heating element comes into its own. Its possibilities are almost unlimited and a few of its present applications are shown below. It can be bent into almost any required shape and the element sheath, which is available in a variety of materials, is insulated from the live spiral. The same skill and care which made the Metrovick domestic "Redring" such a success goes into every heating element for industry.

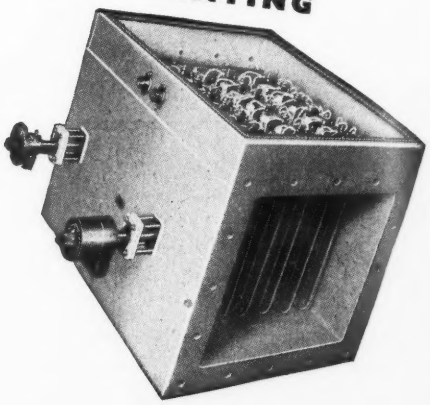
Send for Special Publication 7703/1.



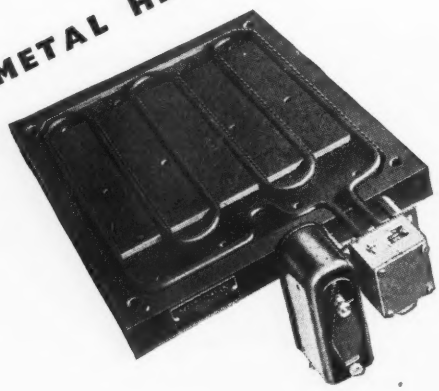
ROLLER HEATING

LIQUID HEATING

AIR HEATING



METAL HEATING



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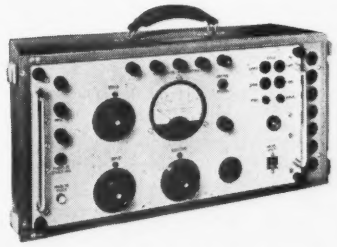
NEW ELECTRICAL EQUIPMENT

Psophometer

In 1951, the Comité Consultatif International Telephonique (C.C.I.F.) drew up specifications and recommendations concerning the measurement of electrical noise in telephone and high-quality programme circuits. The initial result of development work by STANDARD TELEPHONES & CABLES, LTD., Connaught House, Aldwych, London, W.C.2, in meeting the C.C.I.F. requirements was the production of the 74142-A psophometer.

Since then, an improved instrument, the 74142-B, has been introduced. It is a compact and portable instrument operating directly from a.c. mains. It incorporates weighting networks for telephone and broadcast circuits which may be switched into circuit. Alternatively, the same switch may be set to a third position, when the psophometer gives a substantially flat response up to 12 kc/s enabling it to be used as a valve voltmeter. A fourth position of the switch permits the use of an externally connected network such as a 7414; octave filter in place of the internal networks. This facility may be employed in the analysis of noise spectra in broad bands.

The psophometer weighs about 45 lb, and measures 19¼in by 10½in by 10in. It has a frequency range of 50 c/s to 12 kc/s, and measuring range of 0·05 mV to 100 mV with full scale meter deflections corresponding to input voltages of 100 μV, 300 μV, 1 mV, 3 mV, 10 mV, 30 mV, and 100 mV.



Standard Telephones 74142-B psophometer

Automatic Generating Plant

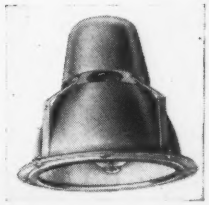
To provide standby power without interruption on failure of the normal supply the "No-break" range of automatic generating plants has been developed by AUSTINLITE, LTD., Lighthouse Works, Smethwick, 40, Birmingham. Models are available with one engine to provide standby to normal a.c. mains supplies; and with two engines to provide the advantages of a standby plant where no mains supply exists. The last mentioned set maintains the load voltage within ± 2½ per cent and the frequency within ± 1 per cent, and during the normal automatic weekly change-over function of the engines, voltage and frequency fall by less than 10 per cent for not longer than 15 sec. The a.c. mains standby plant provides for automatic starting of the engine with continuity of supply on normal mains failure and automatic re-synchronizing of the alternator with the mains, and continuity of supply on mains restoration.

High-Bay Lighting Unit

A new 1 kW mercury high-bay industrial lighting unit has been developed by HOLOPHANE, LTD., Elverton Street, London, S.W.1, for use in steel works, heavy engineering shops and similar lofty industrial interiors.

It embodies a heat-resisting glass reflector which has been specially designed to suit the characteristics of the 1 kW MB/V mercury discharge lamp and provide a broad intensive light distribution. The fitting is of robust construction and has a cast aluminium top canopy and steel cover in which the reflector is sealed.

Four stout metal straps forming part of the fitting assembly allow for supplementary strap suspension from the roof structure and for the provision of stirrup mounting where necessary.



Left: Holophane 1 kW high-bay lighting unit

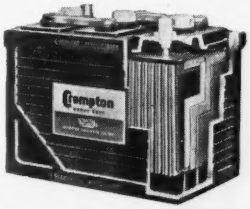
Magnetic Relay

The latest addition to the range of relays manufactured by MAGNETIC DEVICES, LTD., Exning Road, Newmarket, has been carefully designed to suit present-day electronic circuits both as regards size and sensitivity; it measures only 2½in high by 1in by 1⅝in. The contacts are readily accessible on removal of the dust cover and all connections are made from the underside. Both light and heavy duty contacts are available and a sensitivity of 4 mA with a 10,000 ohm coil has been achieved without the sacrifice of contact clearance or pressure.

Commercial Vehicle Battery

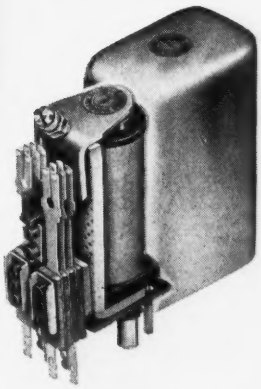
The "KY" range of commercial vehicle batteries has been developed by CROMPTON PARKINSON, LTD., Crompton House, Aldwych, London, W.C.2, with the specific object of providing greatly improved starting performance with less weight and bulk by incorporating a larger number of plates than hitherto, and by designing the plates to work in conjunction with double separation of wood and glass silk.

The new range should be of particular interest to operators of diesel powered vehicles. The batteries are available in either hard wood containers or tough moulded hard rubber containers, and capacities range from 81 to 135 Ah in the 6 V sizes, and from 67 to 135 Ah in the 12 V sizes.



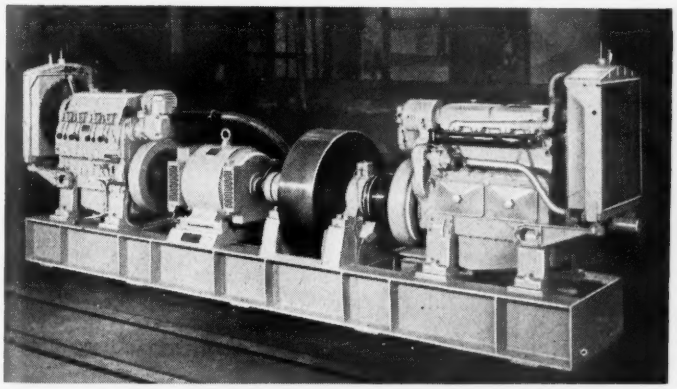
Crompton 6 V "KYI7C2" battery sectioned to show internal construction

Magnetic Devices series 2400 relay



Coffee Service

ELGA PRODUCTS, LTD., Elga Works, Railway Place, Wimbledon, London, S.W.19, are now supplying their "Auto-Perc" (pottery model) coffee percolator with companion set and cups to match. The "Auto-Perc" costs £5 10s and the companion set (6 cups, saucers, cream jug and sugar basin) £3 3s, making £8 13s for the complete service.



Austinlite "No-break" 10 kW double-engine generating set

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 15th December from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1949

4876. Robertson, J. W., and Bellasis, R. O.—Electric motors. 23rd February, 1949. (720360.)

20596. Megatron, Ltd., Veszi, G. A., and Markus, P.—Electrical instruments. 2nd August, 1950. (720262.)

1950

8748. Postmaster General.—Four terminal networks comprising electromagnetically coupled coils. 10th January, 1952. (720263.)

12477. British Thomson-Houston Co., Ltd., and Mills, R. V.—Operating circuits for electric discharge lamps. 18th May, 1951. (720264.)

18865. Gilbert, N. W.—Electric hot plates. 29th October, 1951. (720003.)

28514. Ponting, E. J., Ponting, C. H., and Bayliss, E. G.—Electric fencing. 23rd November, 1951. (720005.)

29461. Dewrance & Co., Ltd.—Indicating and measuring instruments. 29th November, 1951. (720086.)

1951

3628. Siemens & Halske Akt.-Ges.—Electron microscopes. 14th February, 1951. (720008.)

9285. General Electric Co., Ltd., Cates, J., and Jenkins, H. G.—Electric circuit arrangements for operating electric discharge lamps. 18th April, 1952. (720268.)

12930. Watford Electric & Manufacturing Co., Ltd., and Gascoine, A. C.—Dashpots. 3rd June, 1952. (720273.)

14750. P.A.M., Ltd.—Electric control circuits. 19th June, 1952. (720094.)

17220. Dunlop Rubber Co., Ltd.—Apparatus for electrically butt welding wire ends. 11th July, 1952. (720367.)

18797. General Electric Co., Ltd., and Cates, J.—Circuits for operating electric discharge lamps. 31st October, 1952. (720279.)

18804. Telephon- und Telegraphen-fabriks Akt.-Ges. Kapsch & Sohne (Vienna).—Electrical apparatus for measuring and relating plural concurrent phenomena. 9th August, 1951. (720097.)

20163. Metropolitan-Vickers Electrical Co., Ltd.—Instruments for the measurement of air pressure. 10th July, 1952. (720099.)

21996. British Thermostat Co., Ltd.—Thermostatically controlled electrical switching devices for refrigerators. 11th September, 1952. (720281.)

22304. Chamberlain & Hookham, Ltd., Deacon, L. O., and Lewis, H. S.—Protective relay for a 3-phase a.c. distributing system. 4th September, 1952. (720020.)

23389. British Thomson-Houston Co., Ltd.—Electric circuit breakers. 8th October, 1951. (720021.)

23625. Siemens & Halske Akt.-Ges.—Processes for the production of titanate mixtures particularly suitable as dielectric material for condensers. 10th October, 1951. (720285.)

23688. International Business Machines Corporation.—Gaseous electric discharge tubes. 11th October, 1951. (720179.)

24593. Metropolitan-Vickers Electrical Co., Ltd.—Control of electrically operated hoists and winders. 21st October, 1952. (720289.)

25091. Pye, Ltd.—Method of and apparatus for producing television pictures. 27th October, 1952. (720182.)

26208. Standard Coil Products Co., Inc.—High frequency radio amplifiers. 8th November, 1951. (720374.)

27852. Electric & Musical Industries, Ltd.—Telecine apparatus capable of recording television signals upon film. 15th October, 1952. (720185.)

29092. International Business Machines Corporation.—Carry circuit for a parallel accumulator. 12th December, 1951. (720188.)

29121. Metropolitan-Vickers Electrical Co., Ltd.—Construction of dynamo-electric machines. 12th December, 1952. (720295.)

29891. Telefonaktiebolaget L. M. Ericsson.—Automatic gain control arrangements in multi-channel carrier current transmission systems. 20th December, 1951. (720378.)

30069. Electric & Musical Industries, Ltd.—Electrical apparatus. 22nd December, 1952. (720299.)

1952

504. Automatic Electric Laboratories, Inc.—Telephone system with a relay-less line circuit and circuits in co-operation therein for extending a call. 7th January, 1952. (720191.)

3476. Ultra Electric, Ltd.—Magnetic amplifiers. 21st October, 1952. (720197.)

4407. Radio Corporation of America.—Colour television. 19th February, 1952. (720305.)

4518. General Electric Co., Ltd., Kirkness, R. H., and Morrow, A. B.—Electrical apparatus of the kind comprising a thermionic valve. 16th February, 1953. (720306.)

8723. Edison Swan Electric Co., Ltd.—Cathode ray tubes and display systems for colour television receivers. 4th April, 1952. (720315.)

9591. Standard Coil Products Co., Inc.—Tuners for television receivers. 16th April, 1952. (720381.)

11979. British Insulated Callender's Cables, Ltd.—Apparatus for the winding of wire on reels. 7th August, 1953. (720212.)

12681. Telefonaktiebolaget L. M. Ericsson.—Harmonics generators. 19th May, 1952. (720043.)

13005. Ultra Electric, Ltd.—Electromagnetic device. 30th March, 1953. (720323.)

13819. General Electric Co., Ltd.—Sweeping devices. 20th April, 1953. Addition to 681223. (720216.)

13975. Niccolini, U.—Radiator for photomagneto induction of both inert and living matter by means of magnetic fields activated by a cold monochromatic luminous source. 2nd December, 1952. (720326.)

14117. Standard Coil Products Co., Inc.—Tuning devices for television receivers. 4th June, 1952. (720328.)

14889. Call, A. E.—Electrical signs and the like. 13th July, 1953. (720147.)

15104. Oak Mfg. Co.—Multi-position electrical switches. 16th June, 1953. Addition to 676343. (720148.)

15320. Fielden (Electronics), Ltd.—Impedance measuring devices. 17th September, 1953. (720151.)

15523. General Electric Co., Ltd.—Devices for converting plane-polarized electromagnetic energy into elliptically-polarized electromagnetic energy. 16th June, 1953. (720153.)

15578. Allis-Chalmers Manufacturing Co.—Electric circuit breaker employing high and low intensity gas blasts. 20th June, 1952. (720331.)

16025. Marconi's Wireless Telegraph Co., Ltd.—Radio beacons. 28th April, 1953. (720154.)

16433. Radio Corporation of America.—Video signal recording and image reproducing apparatus. 30th June, 1952. (720334.)

16780. Milton, L. M.—Electric shavers. 1st October, 1953. (720158.)

16891. Communications Patents, Ltd.—Wired broadcasting systems. 2nd October, 1953. (720058.)

17571. Standard Telephones & Cables, Ltd.—Radio receivers having a built-in antenna. 11th July, 1952. (720225.)

19447. Smith & Sons (England), Ltd. and Furzehill Laboratories, Ltd. — Magnetic amplifiers. 29th July, 1953. (720121.)

19677. Hughes & Co., Ltd., F. A.—Electrical connections. 30th July, 1953. (720339.)

19940. General Electric Co., Ltd. and Easter, B.—Apparatus for deriving unmodulated electric oscillations from amplitude modulated electric oscillations. 10th August, 1953. (720340.)

22408. Ray-o-Vac Co.—Primary electric batteries. 5th September, 1952. (720[illegible].)

23706. British Thomson-Houston Co., Ltd.—Automatic current control systems. 4th August, 1953. (720128.)

24827. Philips Electrical Industries Ltd.—Electric incandescent lamps. 3rd October, 1952. (720130.)

25429. Philips Electrical Industries Ltd.—Rolled capacitors. 10th October, 1952. (720240.)

27204. Compagnie Générale d'Electricité.—Flexible repeater for submarine electric cables. 29th October, 1952. (720243.)

27896. Schoberle, F.—Method of operating electrically heated cooking plates. 5th November, 1952. (720356.)

28802. General Electric Co.—Thrust bearings. 14th November, 1952. (720358.)

29099. Aircraft Marine Products, Inc.—Electrical connectors. 18th November, 1952. (720134.)

31099. Maschinenfabrik Oerlikon.—Method of insulating a high voltage dynamo-electric machine winding. 8th December, 1952. (720076.)

32462. Schuler, X.—Electric plug. 22nd December, 1952. (720254.)

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 27th November:—

WAVEFLEX. No. B728,034, Class 9. Electromagnetic flexible wave guides for use in electric high frequency transmission systems.—Titeflex Inc., Newark, N.J., U.S.A. Address for service, c/o Andrews & Byrne, 201, Bank Chambers, 329, High Holborn, London, W.C.1.

STABILIDYNE. No. 730,541, Class 9. Radio receiving and transmitting apparatus, sound recording and sound reproducing apparatus, etc. — Compagnie Générale de Télégraphie sans Fil, Paris, France. Address for service, c/o Haseltine, Lake & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

PARABLOCK. No. 731,227, Class 9. Electrical apparatus and instruments, electrical connectors and electrical conductors.—British Thomson-Houston Co., Ltd., Crown House, Aldwych, London, W.C.2.

MAPEL. No. 731,238, Class 9. Electrical apparatus for use in the cathodic protection of metal.—Metal & Pipeline Endurance, Ltd., 22, Queen Anne's Gate, London, S.W.1.

VITRICON. No. 733,382, Class 9. Electrical apparatus and instruments and parts.—Welwyn Electrical Laboratories, Ltd., Trading Estate, Bedlington Station, Northumberland.

GENERATION AND DEVELOPMENT

AT LAST WEEK'S MEETING of the Eastern Electricity Consultative Council the chairman (Ald. W. J. Bennett) reported that the Tariffs Sub-Committee was continuing its discussions on the tariff revisions proposed by the Board to meet the very heavy financial losses that were anticipated over the next few years, for which the increased price of coal was mainly responsible.

Regret was expressed at the withdrawal of meter cards in view of the small cost, the card lasting about ten years. It was thought that the Council should have been consulted before action was taken. As there was some doubt regarding the position of consumers who wished to retain their cards the Council decided to ask the Board for further information.

The chairman reported the receipt of a letter from the Central Authority indicating that three members of each Council instead of two would be invited to next year's British Electrical Power Convention.

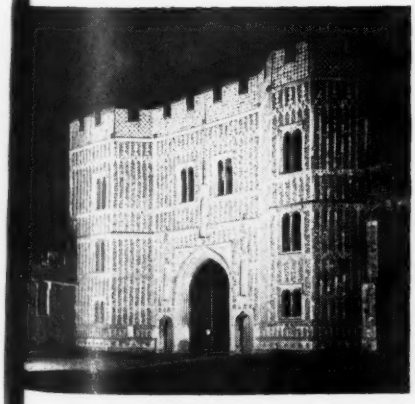
Hydro-Electric Tunnel

Sir Hugh Mackenzie, deputy chairman of the North of Scotland Hydro-Electric Board, recently fired the last explosive shot to complete the driving of the 5 mile Glascarnoch tunnel of the Conon Basin development. At a luncheon given by the contractors, A. M. Carmichael, Ltd., Sir Hugh Mackenzie said the Conon Basin project would be of enormous benefit not only to the Highlands but to the whole of Great Britain. When the Orrin and Garry–Moriston schemes had been finished the saving in coal would be of such magnitude that Britain would be able to export coal.

American Power Dispute Settled

The *Electrical World* reports that none of the Government agencies concerned with the Dixon-Yates power contract has disapproved the contract. This appears to end a dispute in which the Tennessee Valley Authority was involved. It related to the supply of power to the Atomic Energy Commission which the T.V.A. considered should be its prerogative. A scheme put forward by private interests, headed by Messrs. Dixon & Yates, involving the erection of a 600 MW steam plant, was favoured. The chairman of the T.V.A. is said to have agreed that the contract as now drawn up was in a form satisfactory to his Authority.

The gatehouse of St. Osyth's Priory, Colchester, Essex, floodlit by Ediswan "Festival" projectors. The contractors for the installation were E. H. Ruddock, Ltd., Brightlingsea



275 kV Sealing Ends

The outgoing 132 kV oil-filled cables associated with generators 1 and 2 at Brighton "B" power station are terminated by outdoor sealing ends at the foot of a terminal tower which takes these circuits by overhead line across Shoreham Harbour. These sealing ends are within 100 yd of the sea and despite protective barriers against direct spray, trouble was experienced due to salt deposits accumulating on the porcelain insulators and causing flashovers during bad weather.

To alleviate this trouble, the British Electricity Authority has recently replaced the 132 kV sealing ends with 275 kV types, thus increasing the length of the tracking path and consequently reducing the need for frequent cleaning of the porcelain insulators.

To avoid excavating and re-routing some 100 yd of the existing 132 kV cables, the additional length of core required to make the 275 kV sealing ends was obtained by jointing a short length on to each of the ends of the six single-core cables. The resulting straight joints were accommodated within the new sealing ends. The 275 kV sealing ends were supplied and installed by Pirelli-General Cable Works, Ltd., who also carried out the previous installation.

Change-Over

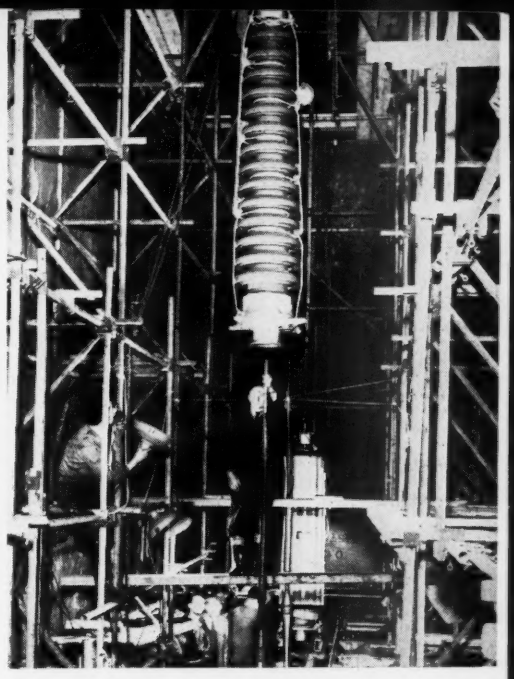
Speaking at a meeting of the Broadstairs Chamber of Commerce, Mr. H. J. C. Carte, manager of the Thanet District of the South Eastern Electricity Board, said that most houses, hotels and business premises in Broadstairs would be supplied with a.c. within the next year or so.

Droitwich All-Electric Flats

Economies aimed at keeping down the rents, if accepted by the Borough Council, will give Droitwich its first all-electric housing estate. These proposals are made by the borough surveyor (Mr. G. L. Robinson) for the new Chawson estate, where building will begin in 1955 to accommodate 400 families. Mr. Robinson, at the request of the Council, has suggested several economies, the most important of which he believes to be an all-electric estate. This will save money by omitting gas piping and fittings in the houses. Gas mains will be run underneath the streets, however, so that tenants, if they wish, may have their homes connected to the gas supply at a charge of about £4 or £5.

Spanish-French Power Exchange

Under a contract approved by the Spanish Government the Fenosa-Sil hydro-electric group and Electricité de France are to interchange electricity supplies, Spain providing France with up to 100 million kWh between 15th October and 15th May and France returning the power during the summer. Usually Spain has surplus power during the winter while in France the power stations use water from high mountain snow, which melts in the summer. Hitherto interchange of electricity has only been carried out on a much smaller scale.



Preparing to lower the porcelain insulator of a 275 kV sealing end over one of the completed cable ends embodying a straight joint at Brighton "B" station

Argentine Water Power

Work has started on the construction of the second hydro-electric plant at the Nihuil falls on the Atuel river in Mendoza Province, Argentina. The new plant will have an installed capacity of 85,000 kW and power will be conveyed over 224 km of aluminium transmission lines to the towns of Mendoza and San Rafael. A start is soon to be made on the Ipizca dam at Ancasti, Province of Catamarca, and tenders are to be called for the building of another dam in La Canada de Carpinteria, Catamarca Province.

Power Expansion in Alberta

An Alberta power development programme costing more than $6·5 million has been announced by Mr. F. A. Brownie, president of Canadian Utilities, Ltd. The scheme includes the building of a steam power plant on Battle River, 111 miles south-east of Edmonton, and the erection of two transmission lines, one from Forestburg to Vermilion and the other from Forestburg to Halkirk, Alberta. General construction will start in the spring and the plant is scheduled for completion in 1956.

Atomic Generation in Canada

Dr. G. C. Laurence, research director for chemistry and reactor engineering at the Chalk River plant, Ontario, stated recently that good progress was being made towards economical production of electricity by atomic power and by the early 1960's they thought it would be possible to produce electricity in central power stations more economically than with coal. After the St. Lawrence River power project had come into production there would be no more unused water power of any importance in Ontario available for hydro-electric production. Increasing power requirements could be met only by the production of electricity from atomic energy or coal.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—14th January. Brisbane City Council. Six 7,500 kVA transformers. (E.S.B. 26135/54. Ten/11350.)*

Barnsley.—29th November. Corporation. Street lighting equipment. (See this issue.)

Belfast.—16th November. Northern Ireland Housing Trust. Electrical installations in 42 houses at Creggan, Londonderry, and in 34 houses at Warrenpoint. Offices of the Trust, 12, Hope Street.

Belgium.—1st December. Telegraph and Telephone Administration, Brussels. Cables and covered wire. (E.S.B. 25533/54. Ten/11279.)*

Cornwall.—County Council. Electrical services at new county secondary school, Wadebridge. (See this issue.)

Doncaster.—3rd December. R.D.C. Street lighting equipment. (See this issue.)

Ennerdale.—10th December. R.D.C. Wiring of 206 houses. (See this issue.)

India.—26th November. Government of Andhra Electricity Department. Conductors and accessories. (E.S.B. 25571/54. Ten/11268.)* 6th December. Indoor and outdoor switchgear. (E.S.B. 25519/54. Ten/11264.)*

6th January. Director General of Supplies and Disposals, New Delhi. (E.S.B. 25527/54. Ten/11263.)* 7th January. Armoured railway signalling cables. (E.S.B. 25526/54. Ten/11265.)*

Kuwait.—27th November. Government Department of Electricity. Equipment for cathodic corrosion control scheme. (E.S.B. 25487/54. Ten/11300.)*

Longbenton.—22nd November. U.D.C. Street lighting equipment. (See this issue.)

Manchester.—13th December. Rivers Committee. Two overhead electrically driven cranes, three electric hoists, electric clocks, and lighting and floor warming installations in connection with Davyhulme sewage works extensions. City surveyor, Town Hall.

Omagh.—20th November. Tyrone Education Committee. Electrical installation in Coalisland Primary School. Chief education officer, Education Offices.

Pakistan.—16th November. Department of Supply and Development, Karachi. 7,500 MVA transformer. (E.S.B. 25641/54. Ten/11255.)* 17th November. Thirty-four 75 kVA outdoor transformers. (E.S.B. 25642/54. Ten/11251.)* 23rd November. Ten 75 kVA outdoor transformers. (E.S.B. 25643/54. Ten/11250.)*

Reigate.—27th November. Corporation. Street lighting equipment. (See this issue.)

South Africa.—25th November. Union Tender and Supplies Board, Pretoria. Plugs and sockets for telephone connections. (E.S.B. 25647/54. Ten/11253.)*

29th November. Johannesburg City Council. E.h.v. and l.v. cable. (E.S.B. 26155/54. Ten/11360.)*

2nd December. Stores Department, South African Railways, Johannesburg. Electrically driven pumping plant. (E.S.B. 25655/54. Ten/11257.)*

Southern Rhodesia.—18th November. Tender Board, Causeway. Air conditioning unit for Fort Victoria Telephone Exchange. (E.S.B. 25838/54. Ten/11307.)*

19th November. Office of the Controller of Stores and Transport, Ministry of Posts, Causeway. Telephone dry cells. (E.S.B. 25836/54. Ten/11317.)*

Stockport.—14th December. Corporation. Street lighting equipment. (See this issue.)

Thailand.—18th November. Royal Irrigation Department, Bangkok. Lighting equipment, cables and wiring accessories for Chao Phya Dam, Greater Chao Phya project. (E.S.B. 25492/54. Ten/11243.)*

Uruguay.—2nd December. Usinas Electricas y los Telefonos del Estado, Montevideo. Armoured cables and accessories. (E.S.B. 25576/54. Ten/11281.)* 10th December. Telephone apparatus and accessories. (E.S.B. 25661/54. Ten/11291.)*

13th December. Ministerio de Salud Publica, Montevideo. X-ray apparatus. (E.S.B. 25566/54. Ten/11290.)*

Willesden.—1st December. Corporation. Street lighting equipment. (See this issue.)

Wrexham.—22nd November. Corporation. Electrical installations in 272 houses. (See this issue.)

ORDERS PLACED

Blyth.—National Coal Board. Electrical wiring in 220 colliery houses at Malvins Close. —A. Hagerty (Ashington).

Dagenham.—Borough Council. Electrical installation work for houses on the Marks Gate estate: Contract 1 (£3,650).—Evans & Shea. Contract 3 (£1,638).—Edgar C. Porter.

Durham.—County Education Committee. Electrical work at Felling Falla Park Road County school (£1,645).—Dougal and Railton.

Ilford.—Borough Council. Diesel alternator set for Roden Street pumping station (£5,557).—Blackstone & Co. Control panels, switchgear and starters (£5,230).—Igranic.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Birmingham.—New wing at Midland Nerve Hospital, Edgbaston; H. & F. C. Spencer, Ltd., Sutton Road, Erdington, Birmingham.

Bury.—Out-patients' department at Bury General Hospital; Thompson & Brierley, Ltd., Union Sawmills, Bury.

Cumberland.—Library, Maryport (£24,000); county architect, Portland Square, Carlisle.

Darlington.—Erection of Arthur Pease School (£38,000); R. Blackett and Son, builders, Bondgate, Darlington.

Durham.—New wing, St. Hilda's College; Cordingley and McIntyre, architects, The College, Durham.

Edinburgh.—Reconstruction of premises in Princes Street to form departmental stores (about £300,000); Marks and Spencer, Ltd., 82, Baker Street, London, W.1.

Gateshead.—Central pavilion, Saltwell Park (£24,000); borough engineer.

Halifax.—Fire station, Illingworth; borough engineer.

Hemel Hempstead.—Dwellings (66), Warners End; Clifford Culpin, architect, 3, Southampton Place, London, W.C.1.

Hexham.—Two blocks of three-storey flats; surveyor.

Hull.—Dance hall, Ferensway; Mecca, Ltd., 76, Southwark Street, London, S.E.1.

Intake.—School (£140,000) for Doncaster Town Council; borough architect, Doncaster.

Keynsham.—Grammar school; Howard V. Lobb & Partners, architects, 20 Gower Street, London, W.C.1.

Lanarkshire.—Houses (128), at Castlehill, Blantyre, for C.C.; S. MacColl, county architect, County Buildings, Beckford Street, Hamilton.

Leamington.—Extensions to factory on the Tachbrook Road frontage; Lockheed Hydraulic & Brake Co., Leamington Spa.

Leicester.—New Leicester Training College at Scraptoft Hall; city architect.

Levington.—Research station and laboratories; Fisons, Ltd., Harvest House, Ipswich.

Llandudno.—R.C. school at rear of Rhuddlan Avenue; P. & M. White, architects, 40, Granville House, Arundel Street, London, W.C.2.

London.—Mill, Canning Town; Spillers, Ltd., Victoria Docks, E.16.

Office block, Leadenhall Street; Higgs & Hill, Ltd., builders, Crown Works, South Lambeth Road, S.W.8.

Macclesfield.—Extensions to Grammar School for Girls (£100,000); county architect.

Maidenhead.—New municipal buildings in St. Ives Road; C. T. Read, borough surveyor, 14, Craufurd Rise.

Maidstone.—Houses (100), on the Hook Wood estate; A. J. Townsend & Co., Ltd., builders, Woodland Close, Penenden Heath.

Market Deeping. — Secondary school (£59,000) for Kesteven County Council; county architect, Sleaford, Lincs.

Middlesbrough.—Residential hotel, Cambridge Road; J. Smith's Tadcaster Brewery Co., Ltd., Tadcaster.

Berwick Hills No. 2 and 3 county primary schools; Cairns and Byles, consulting engineers, 8, Osborne Road, Newcastle-on-Tyne.

Newcastle-on-Tyne.—Three-storey parking garage, Fenkle Street, for Smarts (Newcastle), Ltd.; W. B. Edwards and Partners, architects, Eldon Place, Newcastle.

Factory, Fenkle Street, for Hindmarch, Heppell & Bourn; E. Jackson, 26, Tyne View, Lemington-on-Tyne.

Northants.—Modern schools at Corny and Daventry and new teaching block at Wellingborough Secondary Technical School; county architect, County Hall, Northampton.

Nottinghamshire.—Administration block at Epperstone Manor police headquarters (£45,000); county architect, County Hall, Trent Bridge, Nottingham.

Oldham.—C. of E. junior school at Holts estate; Leach, Rhodes & Walker, architects, 90, Deansgate, Manchester.

Oxford.—New buildings for Magdalen College School; Booth & Ledeboer, architects, 9, Blackhall Road.

Redcar.—Secondary school; Denis Clarke-Hall, architect, 6, Masons Yard, Duke Street, London, S.W.1.

Sheffield.—Erection of King Egbert Secondary Technical School for Girls; George Longden & Son, Ltd., St. Peters Close, Sheffield.

Stretford.—Extensions to works, Trafford Wharf Road; Morrell Mills & Co., Ltd., Trafford Wharf, 17.

Works extensions; John Stephenson (Casings), Ltd., Moseley Road, 17.

Block of 36 flats at Ingleby site; D. Franklyn, Midland Bank Chambers, Urmston.

Wakefield.—Factory, Thornes Road, for J. Lyons & Co., Ltd; Harlow & Milner, Ltd., Wakefield.

Walsall.—Factory premises at Pleck; Pinfold & Parr, Ltd., toolmakers, 54, Coventry Street, Birmingham, 5.

Weybridge.—Training college for apprentices; Vickers-Armstrongs, Ltd., Aircraft Works.

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* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

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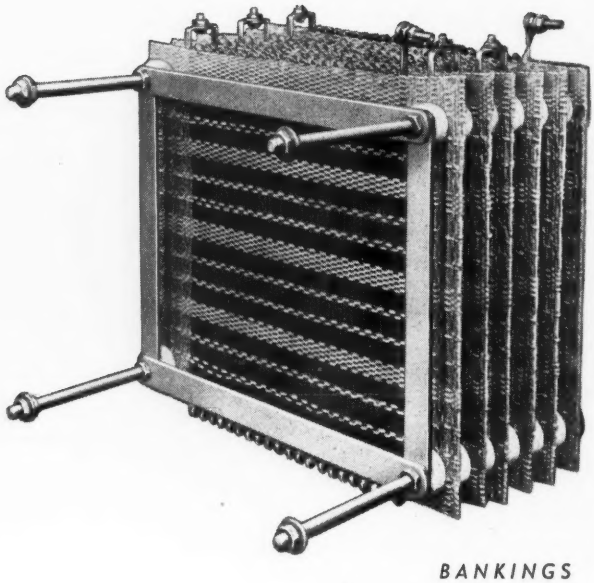

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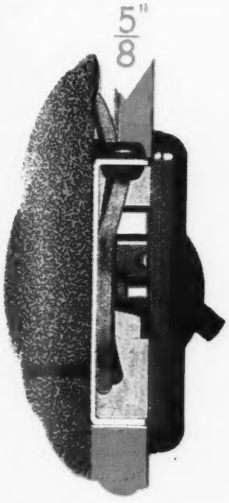
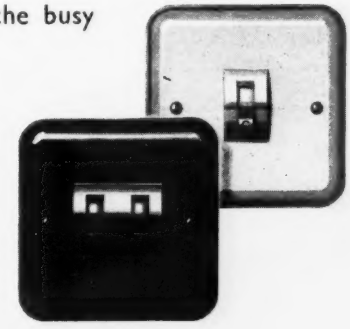


*See *British Standard Code of Practice, CP 211 (1949)*



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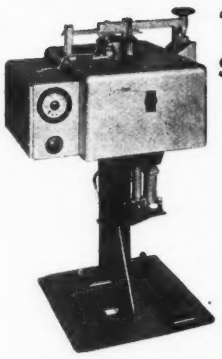

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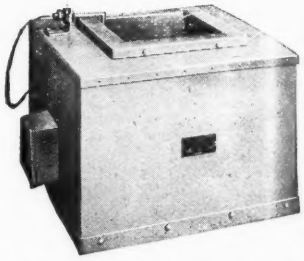

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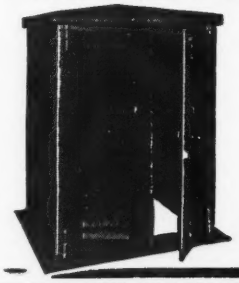

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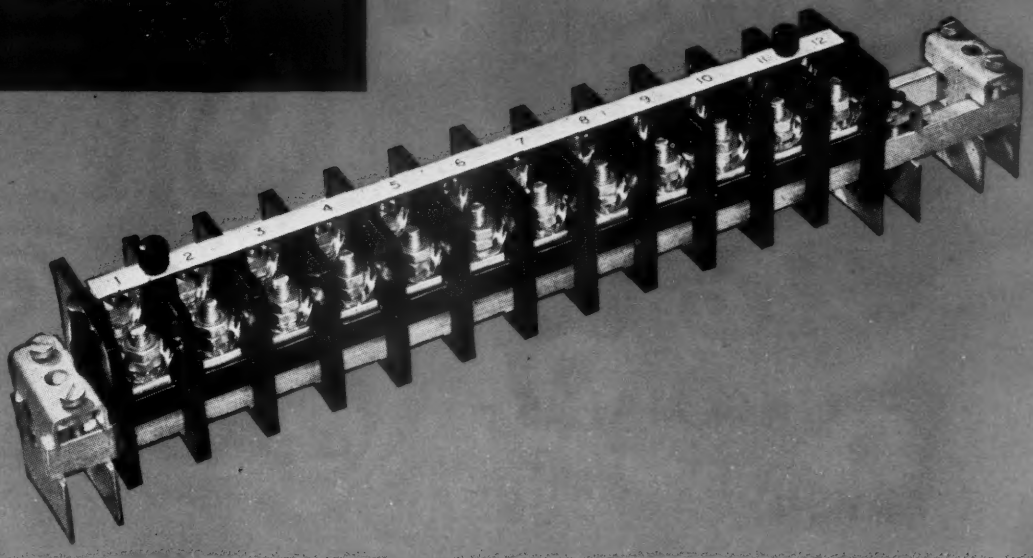

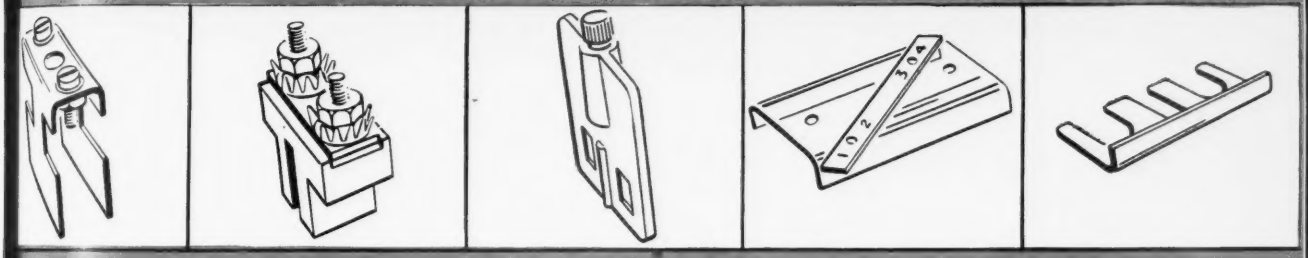

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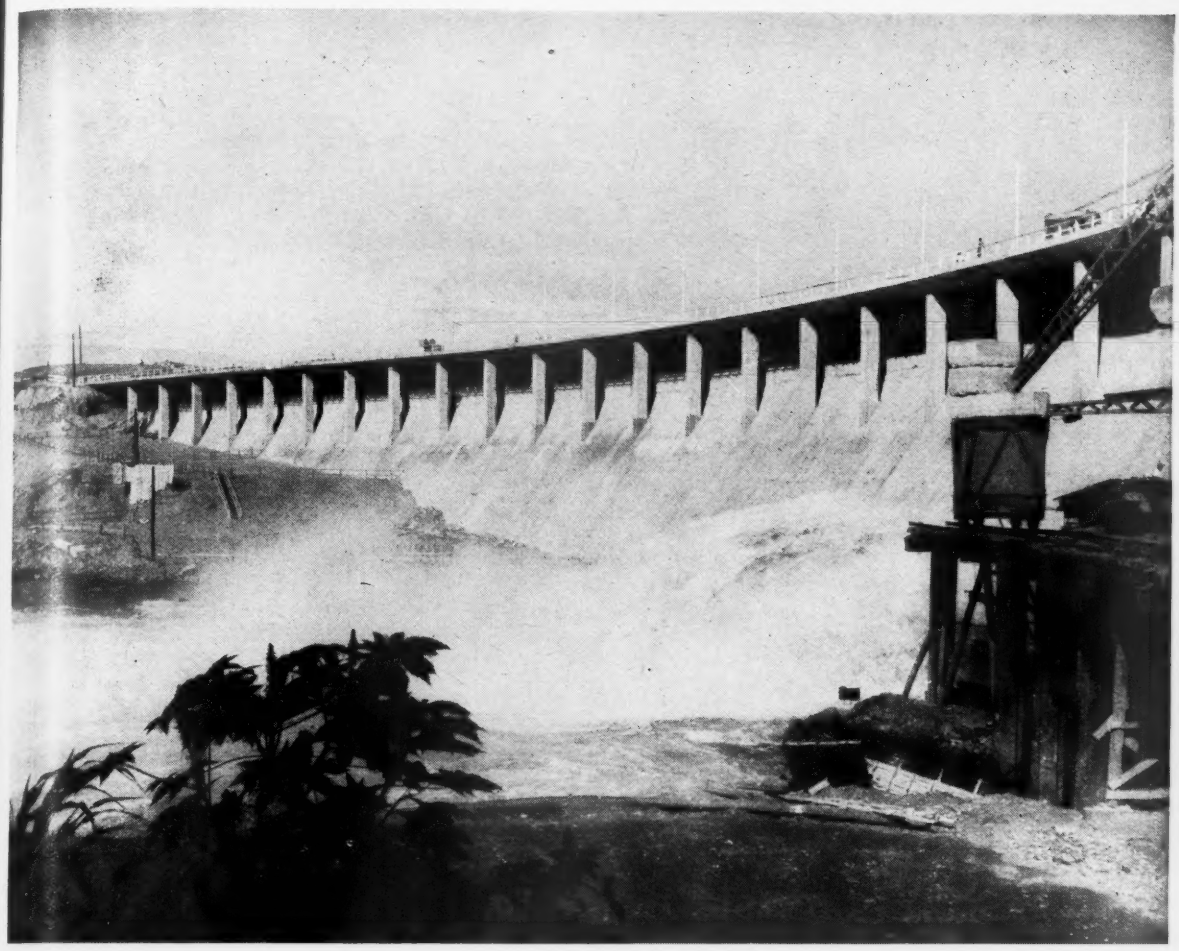

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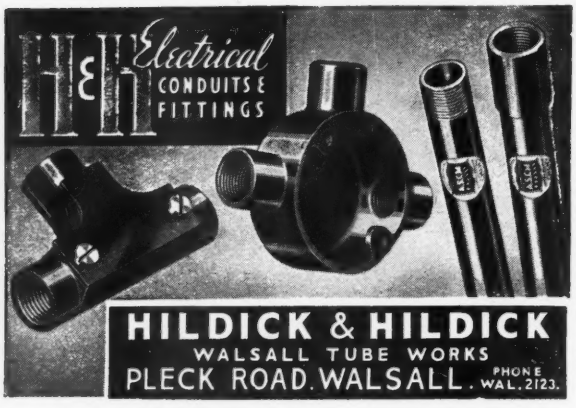

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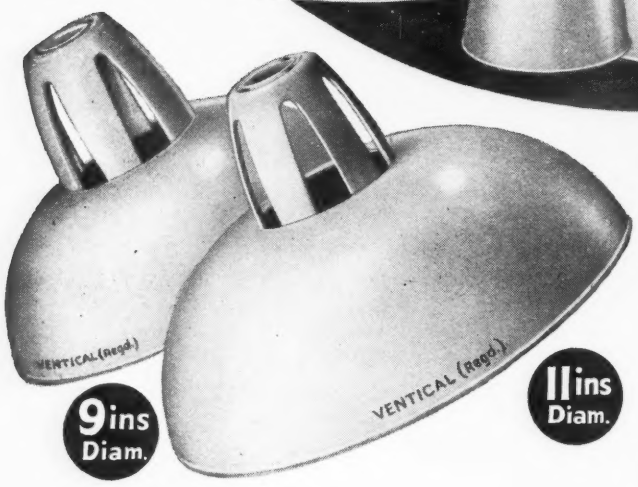

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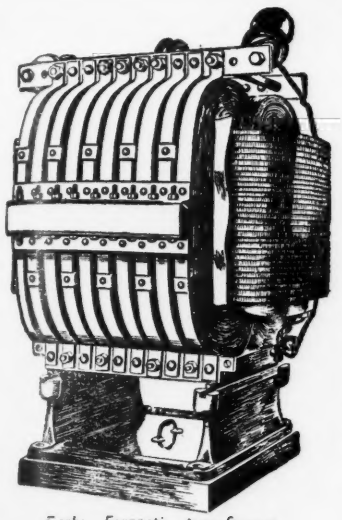

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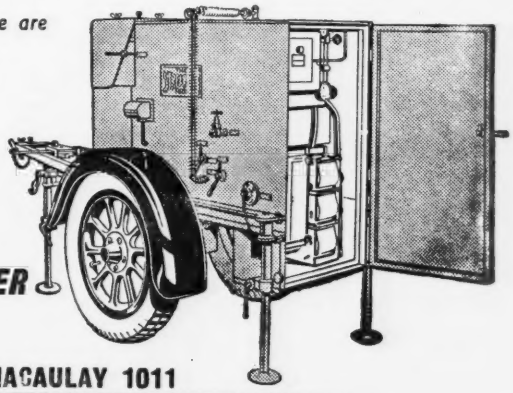

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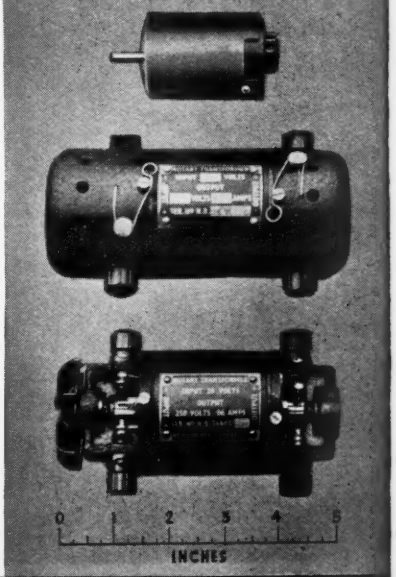

The illustration shows a small high-speed fractional H.P. motor and miniature Rotary Transformers for "Walkie Talkie" and other RADIO applications.

SBAC THE SOCIETY OF BRITISH AIRCRAFT CONSTRUCTORS

NEWTON BROTHERS (DERBY) LTD.

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EST. 1927

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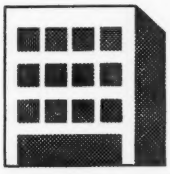
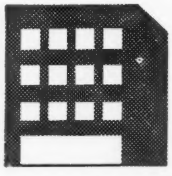
Radiovisor lighting control units operate irrespective of time and are controlled entirely by daylight intensity. This means that you are using artificial lighting *only* when it is required.

AUTOMATIC LIGHTING CONTROL UNIT MARK X. Designed chiefly for use with external artificial lighting, this unit is ideal for controlling the lighting of factory and railway goods yards, etc.; streets, bollard and traffic signs.



AUTOMATIC LIGHTING CONTROL UNIT MARK XV. This unit is for interior lighting and provides a finer degree of control. Widely used in factories, offices, schools, hospitals, etc.



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RADIOVISOR PARENT LTD.
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Telephone: EUSton 5905/6

OTHER PHOTO-ELECTRIC AND ELECTRONIC CONTROLS
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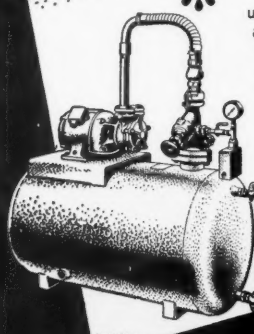

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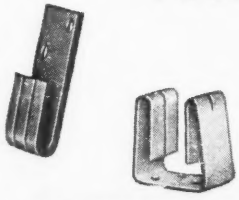

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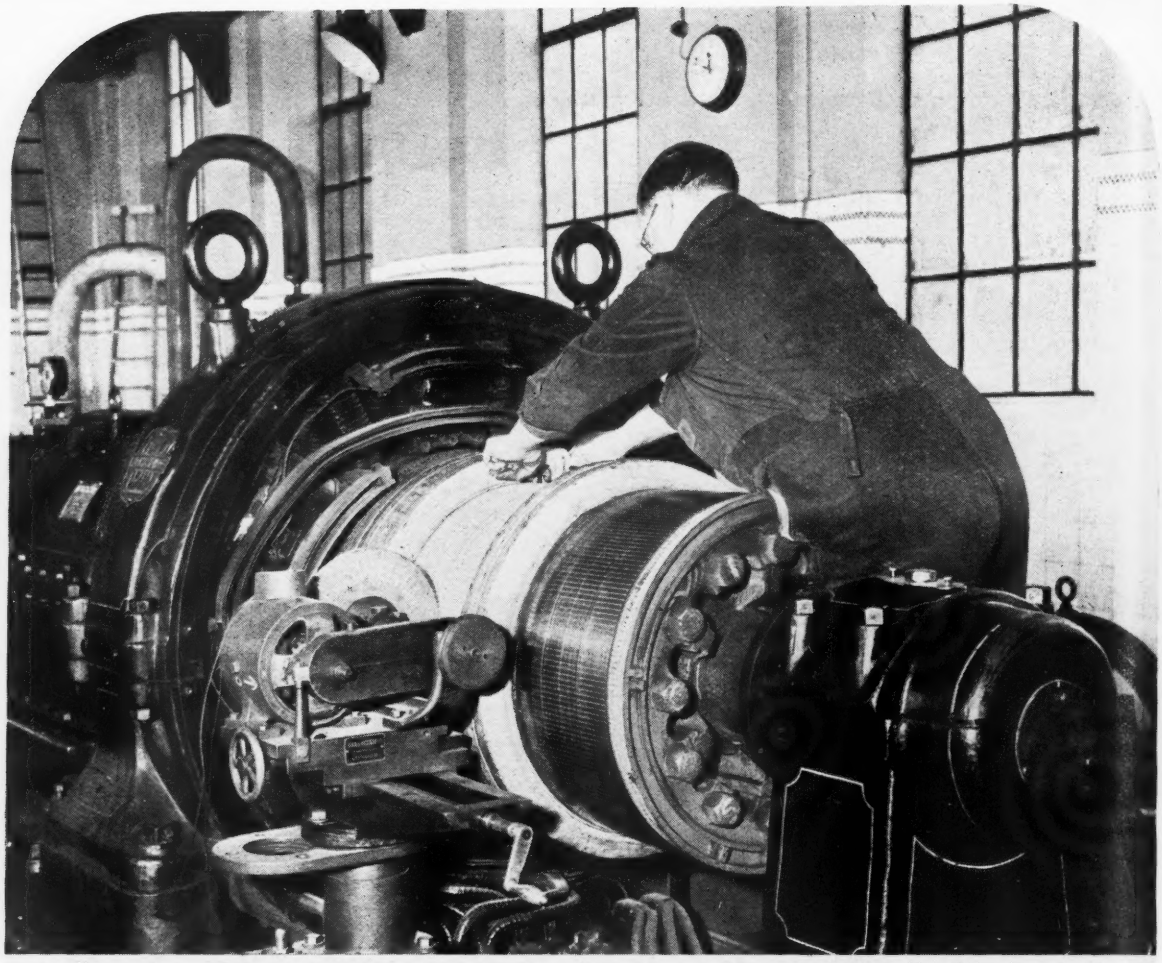

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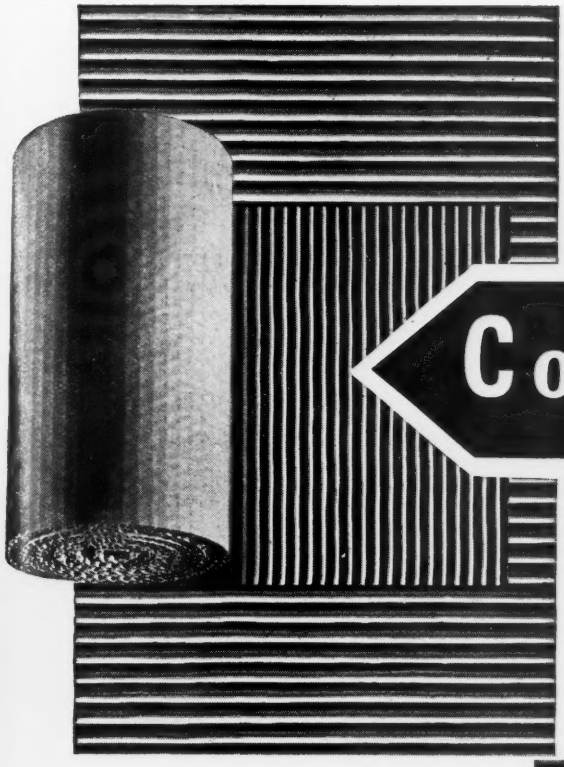

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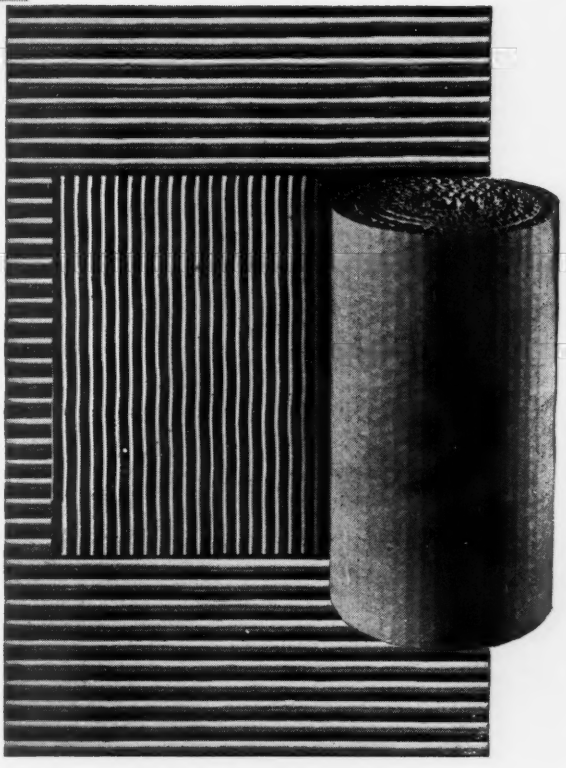
THAT WAY



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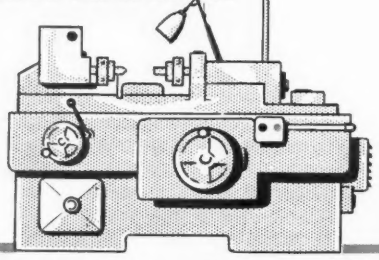

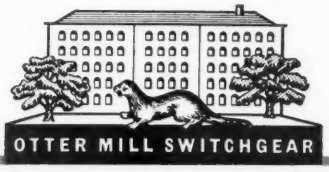

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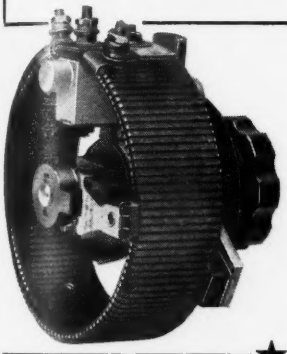
ROTARY RHEOSTATS



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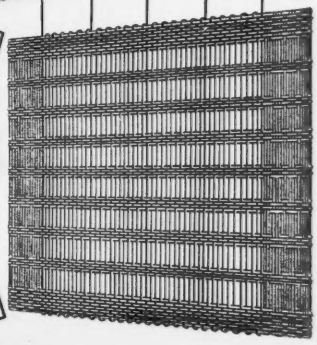
LIGHT WEIGHT

RESISTANCE GRIDS and NETS

ASBESTOS WOVEN



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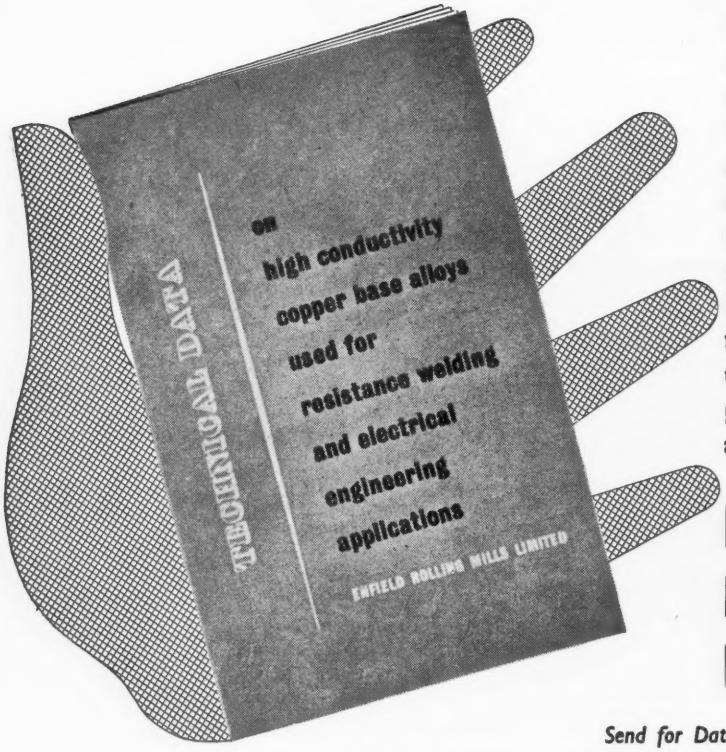

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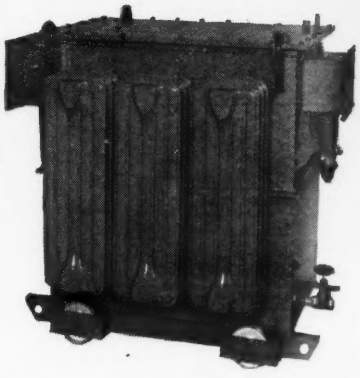
MS11

STURDY Transformers

Sturdy Transformers are manufactured for all industrial applications from 1 KVA to 100 KVA



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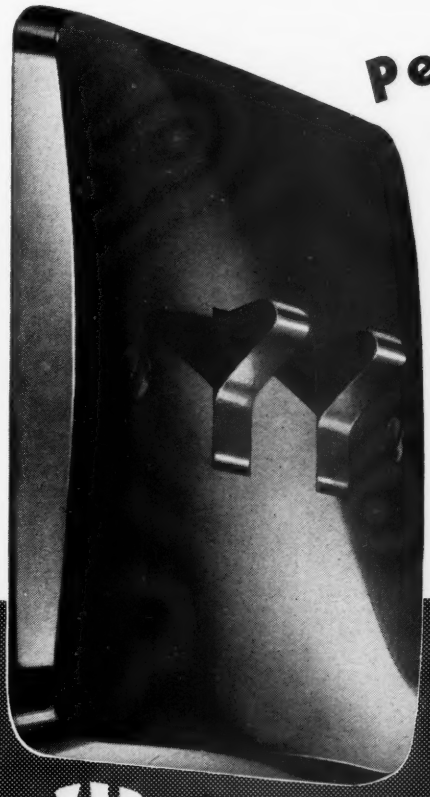

the MK Plateswitch leads

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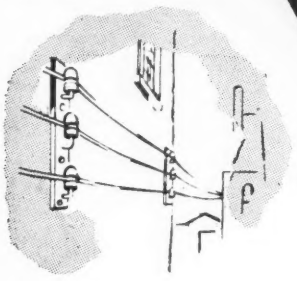
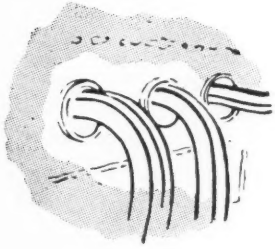
- **FAIL** from abrasion and cutting
- **SOFTEN** upon contact with oil
- **CORRODE** underground
- **PROPAGATE** flame

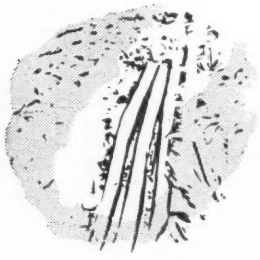
SUSPENDED CABLES . . .



IN CONDUCTORS . . .



UNDERGROUND . . .



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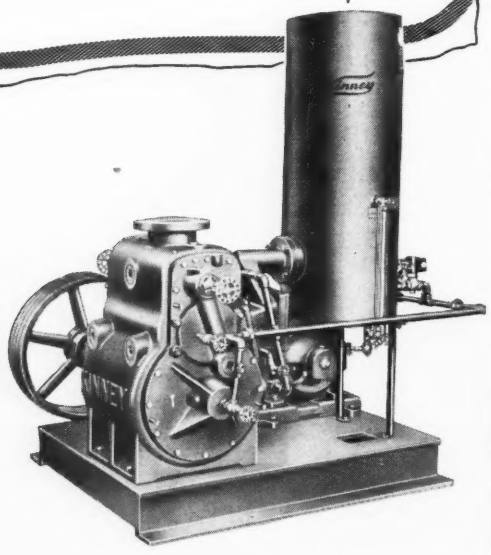

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(ENAMEL WITH VINYL ACETAL BASE)
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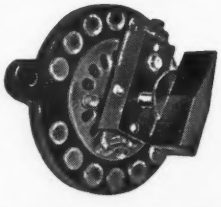

Adjustable from 1 to 15 way

THE SWITCH for
Transformer Tapping Control
15 amp. — 30 amp.
S.P. — D.P. — T.P.

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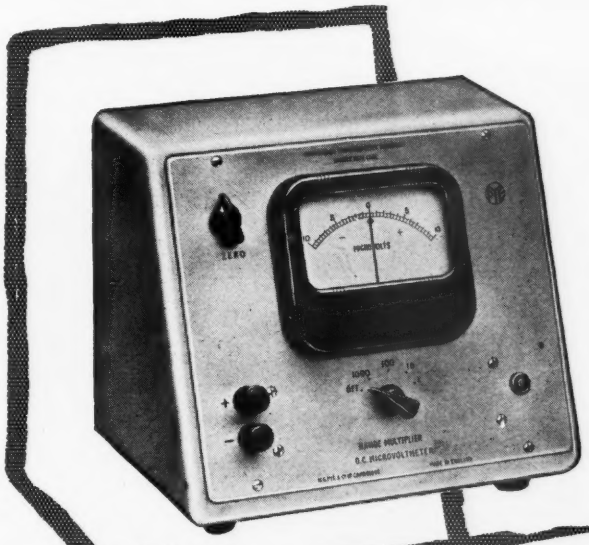

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SCALE:
10μV—0—10μV.

RANGES:
X1, X10, X100, X1000.

INPUT RESISTANCE:
40 ohms.

RESPONSE TIME:
On X1 range 0.5 seconds;
on other ranges 0.15 seconds.

ZERO DRIFT:
Not more than $\pm$ 1μV/hour.

OUTPUT CURRENT:
1 mA into 4000 ohms.
(When used as d.c. Amplifier).

POWER SUPPLY:
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WG53

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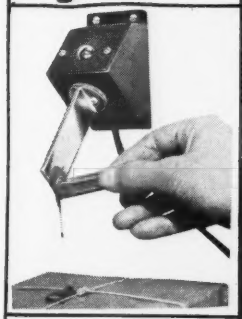
1½ or 2 pint size. Two heats. Water jacket type. No damage if boiled dry. Robust and reliable.



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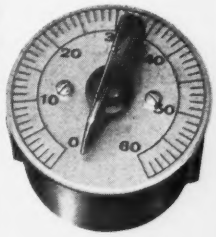
INDUSTRIAL IRONS
Without parallel for robustness, reliability and range. Single or 3-heat flex types.



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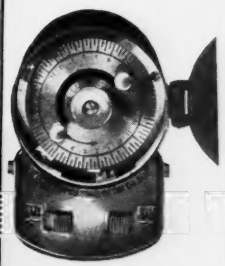
Widely used in industry for accurate timing of processes. Clockwork or synchronous.

GUNFIRE TIME SWITCHES
For all installations from shop to street lighting or for domestic or industrial appliances. Clockwork or synchronous.



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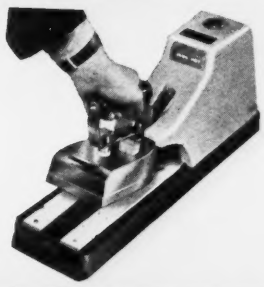
The only safe system for heat controlled pressing. Used everywhere by Manufacturers, Stores, Schools, Hospitals, Laundries, Shipping, etc.



These goods have served industry faithfully for many years. You can rely on the efficiency of Dowsing products.

Fit Dowsings, streamline your business and increase your profits.

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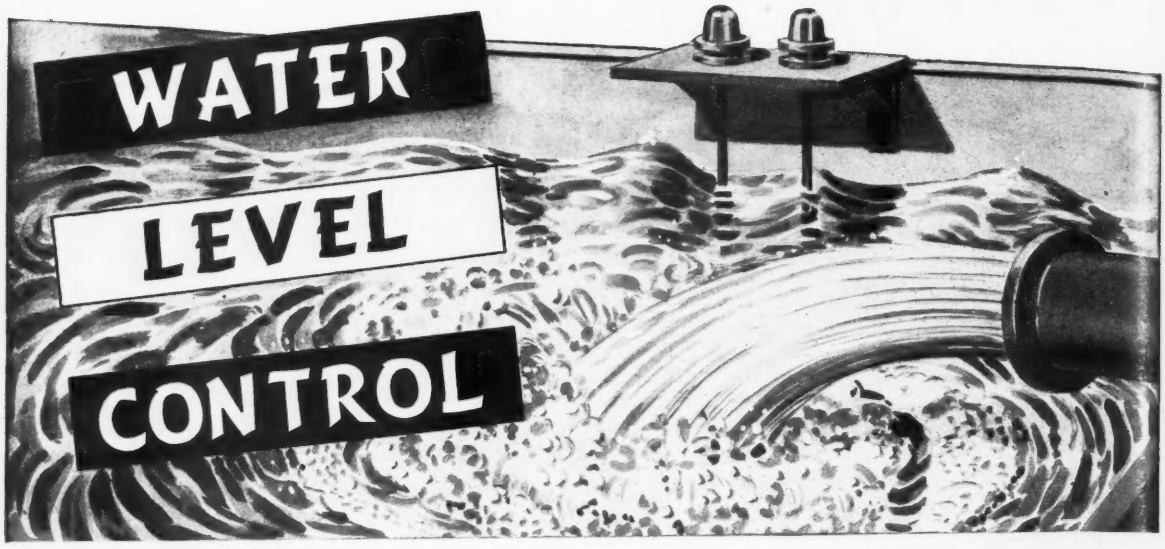
COMPANY (Electrical Manufrs.) LTD.

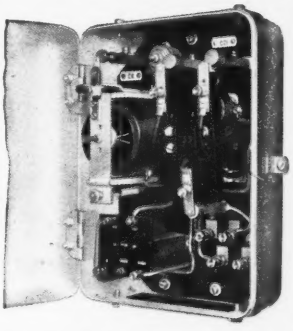
Kangley Bridge Road,
Lower Sydenham, London, S.E.26

Telephones: SYDenham 7016-8



IGRANIC **DIPSTICK** WATER LEVEL CONTROL

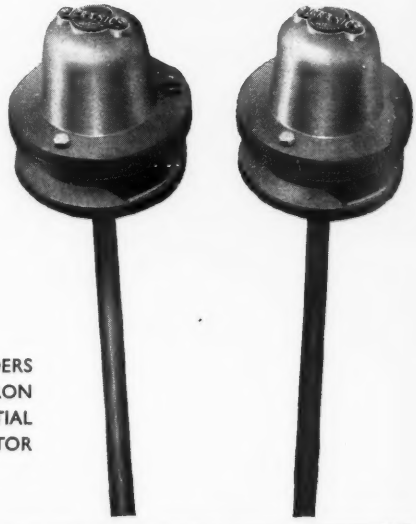
PUMPS OR OTHER MACHINERY OPERATED AUTOMATICALLY BY CHANGE IN WATER LEVELS REQUIRE A ROBUST, EFFICIENT AND TROUBLE-FREE CONTROL SYSTEM



CATALOGUE 95551. SENSITIVE TYPE DIPSTICK WATER LEVEL CONTROL RELAY

THE IGRANIC DIPSTICK CONTROL SYSTEM MEETS ALL THESE REQUIREMENTS AND IS PARTICULARLY RECOMMENDED FOR ELIMINATING ERRATIC OPERATION DUE TO TURBULENCE

FULL PARTICULARS ON APPLICATION TO PUBLICITY DEPT., BEDFORD



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Electric Appliances

NATIONALLY advertised, attractively finished and well designed, Goblin Products always command a ready sale

Full Deferred Terms and H.P. Service

The BRITISH VACUUM CLEANER & ENGINEERING Co. Ltd. (Dept. 4/AE), GOBLIN WORKS, LEATHERHEAD, SURREY

WHICH is WHICH?
You KNOW, but do your customers know?

To follow the "Safety First" recommendation, make sure your electrical leads, whether to Domestic Appliances or to Machine Tools, etc., are clearly defined. "Viskrings" simply slipped over the core-wires and/or the outer casing of the leads do the job and put an end to confusion or doubt.

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- DO NOT INCREASE DIAMETER OF LEAD

"VISKRINGS"

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VISCOSE DEVELOPMENT CO. LTD.
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CHANCERY 8111

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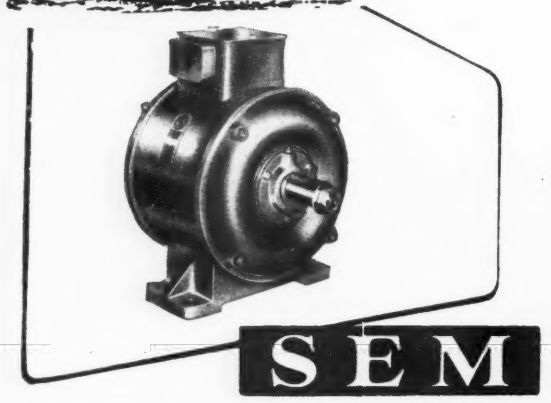

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Production :—Modern factory and tools — Strict inspection.

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Electric truck motors up to 10 H.P. and control gear

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- Strong lifting device for tray —heat insulated handles.
- In FIVE SIZES from 9" x 5" x 3" up to 20" x 10" x 7".

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"STOP lightfingers"

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LOX-ALL *Electric Lamp Locks*

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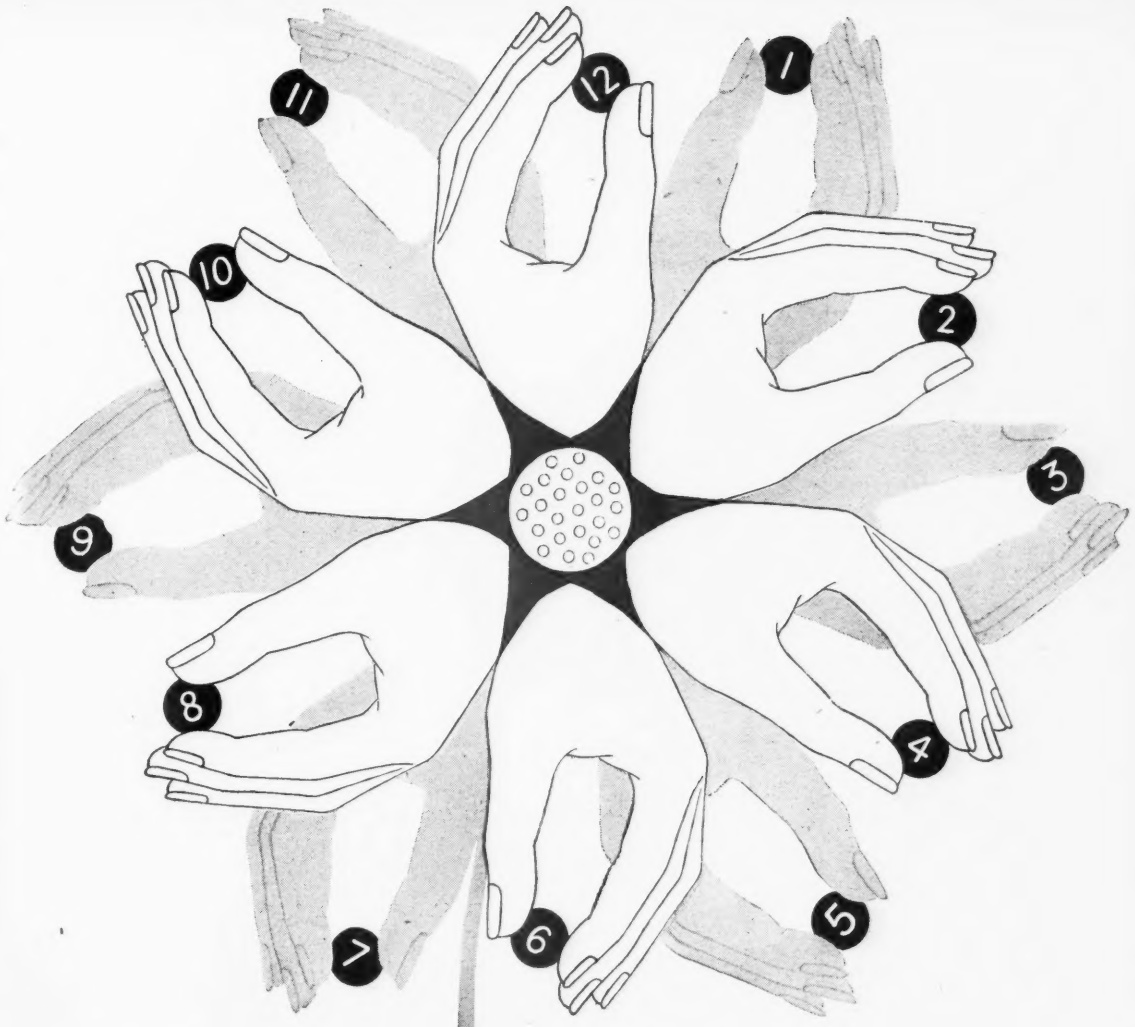

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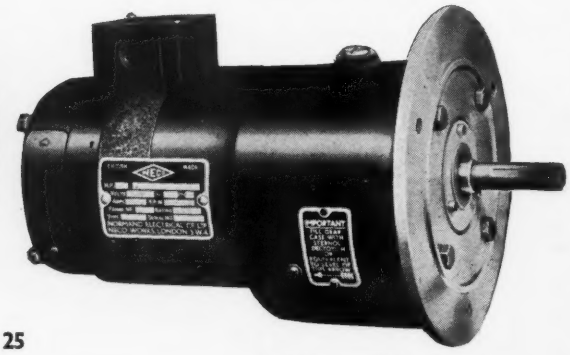
CROMPTON PARKINSON LTD., CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2. TEL: CHANCERY 3333

small geared motors by NECO TRADE MARK

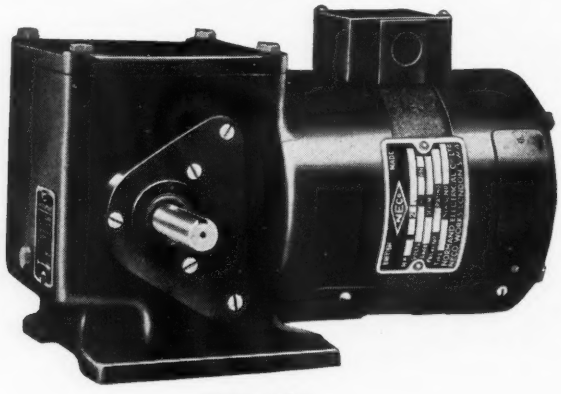


TYPE 25

foot mounted *in-line drive* *flange mounted*

Type 25, in-line drive, and SW, right angle drive, have the same bolting plan and shaft height, and can be made to mount in any specified position, while Type 25 can also be flange mounted. $\frac{1}{8}$ H.P. motors, 3-phase s.c., 1-phase R.I., D.C., A.C. series, or Universal. Final speeds of Type 25 are between 312 and 0.079 r.p.m., and of SW 270 to 0.055 r.p.m., without a change of dimensions.

NECO geared motors with outputs up to 1500 lb.ft. NECO ungeared motors up to 5 H.P.



TYPE SW

right angle drive

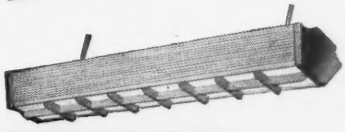
Full details of the complete **NECO** *range from :*

NORMAND ELECTRICAL CO · LTD

Dept. E.R., North Street, Clapham Common, London, S.W.4 ***Tel. : MACaulay 3211/2/3/4***

SMITHLITE
QUALITY PRODUCTS

TUNGSTEN FITTINGS
These illustrations show just a few of our Tungsten range and like all our products are unsurpassed for quality, value and finish.



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Our Fluorescent range is second to none, all fittings being rust proof and stove enamelled. Totally enclosed control gear is fitted as standard.

WASH BOILERS
This Smithlite Wash Boiler has 50 years' manufacturing experience behind it and is designed to give years of satisfactory service under the most exacting conditions. Entire unit is fully guaranteed. Tinned copper container with 10 gal. capacity. Aluminium lid with recessed heat resisting handle, loading 3 k.w., 3 heat and off, double pole switch, chrome tap of neat design. Height 26", diameter 17¾". Height of tap 12¾".

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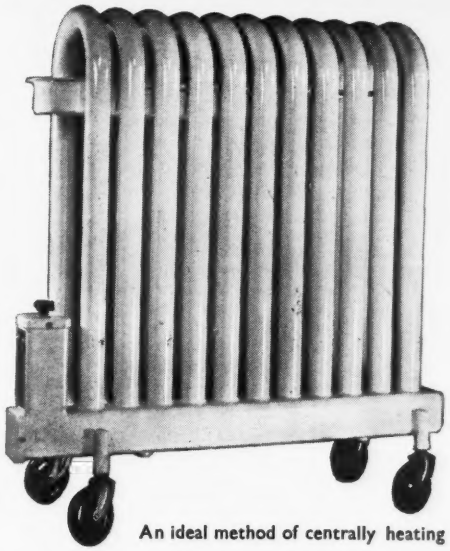

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PORTABLE ELECTRIC CENTRAL HEATING
WARMTH
WHERE and WHEN YOU WANT IT

An ideal method of centrally heating any home with minimum of installation and maximum control without attention.

● **HEAT CONTROL.** *Adjustable 3-way.* ● **SAFETY.** *Oil contained in hermetically sealed pipes — cannot overheat*
● **PORTABLE.** *Easily moved on smooth running wheel-castors.* ● **HUMIDIFIER.** *Available if required.*

The OCEAN heater gives all-round radiation and maintains an even temperature, instantly adjustable to suit personal comfort. **The OCEAN** is completely safe — the oil-filled steel tubes are heated by easily accessible electric immersion element. All voltages A.C.

The OCEAN is made in three sizes and retails at the following prices:

Size 1.	720 watts.	List Price	£15. 17. 0 + P.T. £5. 16. 6
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Enquire through your usual wholesaler or direct to:—
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STROOD, ROCHESTER, KENT *Telephone: STROOD 7626*

PRICE £5 15. 0d. + P.T.

Regd. Design No. 874623

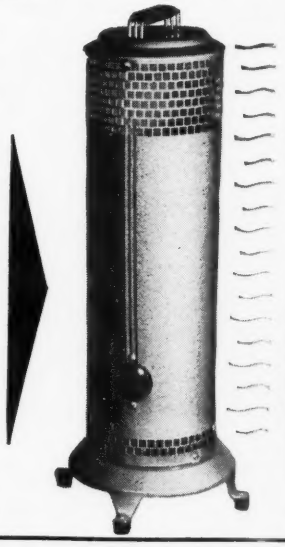
THE NEW GILLOTT Cotswold FAN HEATER

BLOWS HOT OR COLD

New — low in cost and economical to run. Safe — it is ideal for any room in the house. Used either on the floor or as a wall fitting, the 'Cotswold' heater silently fans hot air in Winter or cold air in Summer to the farthest corners of the room.

Of distinguished appearance, with neutral coloured body, deep maroon heat-resisting handle and die-cast stand.

THE MOST EFFECTIVE AND ECONOMICAL FORM OF SPACE HEATING IN WINTER OR COOLING IN SUMMER.



and the PROVED GILLOTT CONVECTOR HEATERS

Gloucester (1½ Kw switched) and **Chalford** (1 Kw)

THEY'RE ECONOMICAL LOW PRICED AND SAFE

PROVED, ECONOMICAL, unequalled value. These all-purpose Domestic Electric Space Heaters give you steady, even warmth, effectively protected to avoid waste or overheating. Safe — Portable — Heatproof — Stable. Fine appearance, attractively finished in bronze.

GLOUCESTER (1½ Kw switched 750 w) **£3 15. 0d.**
CHALFORD (1 Kw) **£3 0. 0d.** *Plus Purchase Tax.*

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One of the Group of Companies Associated with the Southern Areas Electric Corporation, Ltd.
COTSWOLD WORKS, CHALFORD, Near STROUD, GLOUCESTERSHIRE
Telephone : Brimscombe 2276/7

High resistance to oils, acids, moisture and corrosion. Provides a perfect insulating seal, even under extreme temperatures. Great dielectric strength (10,000 volts). Smooth plastic surface. High Elasticity. Ultra Endurance.

For all electrical insulating, sealing, binding, wrapping, identification, etc. Available in 7 colours. In widths of ⅜" upwards.

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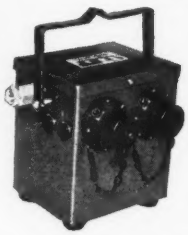
LOW VOLTAGE LIGHTING TRANSFORMER
In die-cast Aluminium Case, Self-isolating fitted with D.P. on-off Switch and H.R.C. Fuses to B.S.S. 794/38. Can be supplied with 1, 2 or 3 arm Lighting Brackets or Low Voltage Plugs and Sockets.

MEDIUM VOLTAGE ALL INSULATED TEST LAMP
100 — 500 Volts. A.C. D.C. Fitted with H.R.C. Fuses in each prod.



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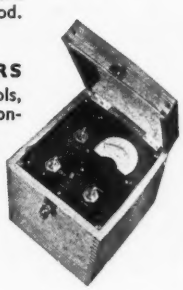
For portable m/c tools, handlamps, etc., Secondary Voltages from 12 V — 110 Volts. Capacities from 50 V.A. to 750 V.A.



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For testing earth fault loop resistance — 2 models available.

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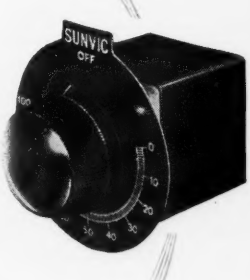

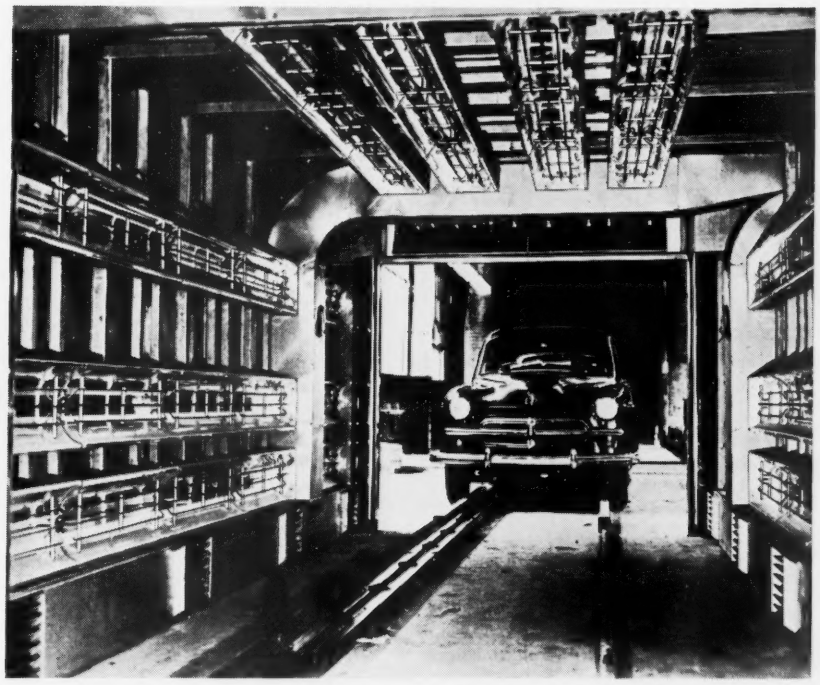

Infra Red speeds the cars. (*Photo by courtesy of Vauxhall Motors Ltd. and Metropolitan-Vickers Electrical Co. Ltd.*)

Infra-red drying ovens are now in regular use to speed up the painting process and reduce production cost. The heat is conveniently controlled by Sunvic Energy Regulators. Just another example of the important part played in modern industry by *CONTROL*

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SUNVIC CONTROLS LTD. (*Special Products Division*), No. 1 Factory, Eastern Industrial Estate, HARLOW, ESSEX. *Tel. : Harlow 24231/5*

Manufacturers of Pneumatic and Electrical Instruments for detection, measurement, control and recording of Temperature, Flow, Liquid Level, Specific Gravity and Pressure, in Science and Industry. Vacuum Pumping and Measuring Equipment, etc.

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The care is there..... in every SKF bearing

Every batch of raw material used in the manufacture of SKF ball and roller bearings is subjected to stringent tests like the one shown above, where steel is being examined for structure cleanliness and metallurgical defects. It is one reason why the quality of every SKF bearing is unsurpassed . . . right from the start! To manufacturers of machinery and equipment using rolling bearings this high standard of care means reliability and long life in service

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THE ONLY BRITISH MANUFACTURER OF ALL FOUR BASIC BEARING TYPES: BALL, CYLINDRICAL ROLLER, TAPER ROLLER AND SPHERICAL ROLLER

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BIFURCATED AND TUBULAR

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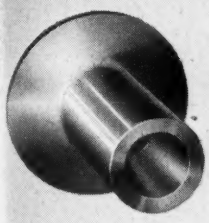
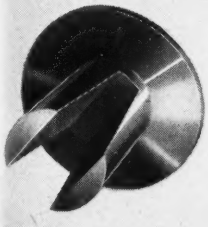
In all Metals & Finishes





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S. & D. RIVET Co.
(PROP. STEELS AND BUSKS LTD.)

ARIEL WORKS · TEMPLE ROAD
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TELEPHONE: 36541-5 TELEGRAMS: ARIEL, LEICESTER

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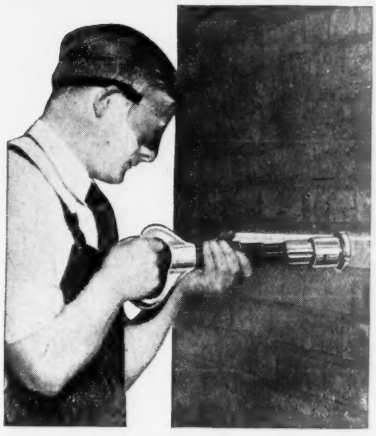
THE *Flashhammer* Foreign
BOLT FIRING TOOL

AUTOMATICALLY FIXES BOLTS AND NAILS TO CONCRETE, BRICKWORK, STEEL, ETC.

THE ONE TOOL COVERS
$\frac{5}{32}$", $\frac{1}{4}$", $\frac{5}{16}$" and $\frac{3}{8}$"
WHITWORTH



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STAND No. 194
PUBLIC WORKS EXHIBITION
OLYMPIA—November 15th-20th, 1954

Sole *Condrup Ltd* Agents

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Phone: Bishopsgate 8741 (3 lines) Grams: "Condrup, Ave, London"

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NEWALL ADJUSTABLE GIRDER CLIPS

Fit all types and sizes of Girders and accommodate Tubes or Armoured Cables from $\frac{5}{8}$" to 2". Tubes and Cables can be run at right angles or parallel to Girders.

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for Contemporary living...

The G.E.C. presents an entirely new range of contemporary lighting fittings. Nearly 100 new designs in exciting gay colours to grace the modern interior

contemporary fittings by.... G.E.C.

The General Electric Co. Ltd.

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ADVERTISEMENTS are accepted up to **First Post on Monday** of the week of issue, and should be addressed to Classified Advertisement Department, Dorset House, Stamford Street, London, S.E.1.

CLASSIFIED advertisements are PREPAID at 3/- per line (approx. 6 words) per insertion. Where an advertisement includes a Box Number this counts as two words and carries an additional charge of 1/-.

DISPLAYED:—£2 per inch, per insertion. Cheques and Postal Orders should be crossed and made payable to ELECTRICAL REVIEW PUBLICATIONS LTD.

SITUATIONS WANTED:—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1, but if not to be delivered to any particular firm or individual they should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Replies in such cases cannot be returned. The name of an advertiser using a Box Number will not be disclosed.

Original testimonials should not be sent with applications for employment

OFFICIAL NOTICES, TENDERS, ETC.

COUNTY OF CORNWALL

County Secondary School, Wadebridge

APPLICATIONS are invited from Electrical Contractors for permission to tender for the Electrical Services sub-contract in connection with the erection of a New County Secondary School for 600 pupils at Wadebridge.

Applications must be accompanied by a short list of recent contracts carried out by the applicants, indicating size, type and value of contract and made in writing to Mr. Sydney Gregson, F.R.I.B.A., County Architect, County Hall, Truro, not later than the 27th November, 1954.

From the applications received a selected number of firms will be invited to tender and requested to forward a deposit of £3 3s. made payable to the Cornwall County Council, which will be refunded on receipt of a bona fide tender.

The closing date for receipt of tenders will be notified when the documents are despatched. The lowest or any tender will not necessarily be accepted, neither will the County Council pay to contractors any fees or expenses incurred in preparing their tenders.

E. T. VERGER,
Clerk of the County Council.

County Hall, Truro.
5th November, 1954. 6027

DONCASTER RURAL DISTRICT COUNCIL

Group A Street Lighting, Route A.630

TENDERS are invited for the supply and installation of 32 street lighting units on the Sheffield-Grimsby Trunk Road (A.630), in the Parish of Warmsworth.

Each lighting unit will consist of a totally enclosed lantern equipped with a 140-watt sodium discharge lamp, mounted on a prestressed concrete column, together with all necessary auxiliary gear. In addition the contract covers the supply and laying of an underground cable to serve the installation.

Specifications, Bills of Quantities, and a Form of Tender may be obtained from, and the Conditions of Contract and Drawings inspected by appointment with, Mr. J. A. Williams, Surveyor to the Council.

Tenders in plain sealed envelopes endorsed "Trunk Road Lighting, Warmsworth" should be delivered to the undersigned not later than Friday, 3rd December, 1954.

B. MELDRUM,
Council Offices, Clerk to the Council.
Nether Hall,
Doncaster.
November, 1954. 6032

BOROUGH OF WREXHAM

Electrical Installation to 272 Houses at Various Sites Within the Borough

TENDERS are invited for the Electrical Installation of the above houses now in course of erection or about to be commenced.

Application for the specification and form of tender should be made to the Borough Engineer and Surveyor, 31, Chester Street, Wrexham, where copies of the plans may also be inspected. The application should be accompanied by a deposit of £2 2s. which will be refunded on receipt of a bona fide tender.

Tenders, sealed in the envelope provided, are to be delivered to the undersigned not later than 12 noon, Monday, 22nd November, 1954.

PHILIP J. WALTERS,
Guildhall, Town Clerk.
Wrexham.
3rd November, 1954. 6028

LONGBENTON URBAN DISTRICT COUNCIL

Public Street Lighting

TENDERS are invited for the supply and for the erection of 26 Sodium Vapour Street Lighting Units, mounted on concrete columns, Great North Road (Trunk Road A.1), Seaton Burn.

Plans can be inspected at the office of the Engineer and Surveyor, and specifications, schedules and form of tender can be obtained on application to Mr. A. E. Sweetman, M.I.Mun.E., Engineer and Surveyor, Council Offices, Forest Hall, Newcastle upon Tyne, on payment of a deposit of £2 2s. returnable only on receipt of a bona fide tender, not subsequently withdrawn, and the return of all documents loaned.

Sealed tenders in a plain envelope endorsed "Public Street Lighting" must be delivered to the undersigned not later than 10 a.m. on 22nd November, 1954.

The Council do not bind themselves to accept the lowest or any tender and reserve the right to divide the contract should they so desire.

G. HARRISON,
November, 1954. Clerk of the Council.
6026

BOROUGH OF WILLESDEN

North Circular Road Street Lighting

TENDERS are invited from experienced contractors for the following Group "A" Lighting work to be carried out as separate contracts over a length of approximately 3½ miles of the North Circular Road.

(a) Supply of Sodium Lanterns and auxiliary equipment.
(b) Supply and erection of concrete columns, wiring and fixing of lanterns and auxiliary equipment.

The contract documents may be obtained from the Borough Engineer and Surveyor, Town Hall, Dyne Road, Kilburn, London, N.W.6, upon application accompanied by a deposit of two guineas which will be returned upon receipt of a bona fide tender not subsequently withdrawn.

Sealed tenders must be submitted so as to reach the undersigned by not later than 10 a.m. on 1st December, 1954.

R. S. FORSTER,
Town Hall, Town Clerk.
Dyne Road,
Kilburn, London, N.W.6. 6030

BOROUGH OF REIGATE

Class A Street Lighting Scheme

TENDERS invited for supply and erection of street lighting equipment on lengths of the Guildford—Maidstone Road (A.25). Specification and general details from Borough Surveyor, Town Hall, Reigate.

Sealed tenders endorsed "Street Lighting" to undersigned by 27th November, 1954.

The Council does not bind itself to accept the lowest or any tender.

HEBER DAVIES,
Town Hall, Town Clerk.
Reigate.
11th November, 1954. 6029

STOCKPORT CORPORATION

TENDERS are invited for Supply, Delivery and Erection of Class B 80-watt Mercury Vapour Street Lighting Installations and Supply of Lanterns, Chokes, Capacitors and Time Switches, etc. Particulars from Borough Surveyor, Town Hall, Stockport. Tenders to be returned by 12 noon, 14th December. 6069

COUNTY BOROUGH OF BARNSLEY

Group A Street Lighting Improvement Schemes

TENDERS are invited for the supply and delivery of Street Lighting Standards and Equipment in connexion with the above schemes.

Forms of Tender and Specifications may be obtained from the Borough Engineer, Town Hall, Barnsley and completed tenders should be returned in the envelopes provided to reach the undersigned not later than Monday, 29th November, 1954.

The Corporation do not bind themselves to accept the lowest or any tender and reserve the right to accept a tender for all or any of the items contained in the Specification.

A. E. GILFILLAN,
Town Hall, Town Clerk.
Barnsley.
November, 1954. 6031

ENNERDALE RURAL DISTRICT COUNCIL

Electric Wiring: Council Houses

TENDERS are invited from Electrical Contractors for the internal wiring of 206 houses at Castle Croft, Egremont, Cumberland.

House types, layout plans and specification may be seen, and forms of tender obtained, at the Engineer's Office, Council Chambers, Cleator, Cumberland.

Sealed tenders, endorsed "Electric Wiring," must be delivered to the undersigned not later than first post on Friday, 10th December, 1954. The Council do not bind themselves to accept the lowest or any tender.

I. F. HARRISON,
Council Chambers, Clerk of the Council.
Cleator, Cumberland. 5958

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through the Local office of the Ministry of Labour and National Service, etc., if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order, 1952.

SOUTH WEST SCOTLAND ELECTRICITY BOARD

Lanarkshire Sub-Area

Appointment of 3rd Assistant Engineer (Sub-Area Planning and Development)

APPLICATIONS are invited for the appointment of 3rd ASSISTANT ENGINEER in the Sub-Area Planning and Development Department.

Candidates should be Graduates of the Institution of Electrical Engineers or hold equivalent qualifications. They should have had a sound engineering training with subsequent experience in the planning and layout of 11 kV and lower voltage networks. They should also be conversant with load flow diagrams and voltage drop calculations.

The Salary and Conditions of Service will be in accordance with the National Joint Board Agreement, Schedule A, the present Classification road Grading being K10, Salary £719/£750 per annum, which will be subject to the statutory deductions including superannuation. The successful candidate will require to reside within a reasonable distance of the Sub-Area Offices in Hamilton.

Applications forms which may be obtained from the undersigned should be forwarded to this office within 14 days of the date of this advertisement.

DUGALD SMITH,
137, Almada Street, Manager.
Hamilton. 6025

YORKSHIRE ELECTRICITY BOARD

Head Office

EDUCATION & TRAINING OFFICER. Applications are invited for the post of Education and Training Officer, in the Secretary's Department, at the Head Office of the Board.

Candidates should have wide experience in the field of education and training in industry, and should be capable of preparing schemes of training for all grades of employees. Experience in the electricity supply industry is desirable but not essential.

Salary N.J.C. Grade 9, £1,000/£40/£1,120 per annum.

THIRD ASSISTANT ENGINEERS (System Control) (Shift). Engineers are required for training as Distribution System Control Engineers. Applicants should have had reasonable practical experience in the operation of large distribution systems operating at voltages up to 33 kV, and should be Corporate Members of the Institution of Electrical Engineers, or possess equivalent qualifications.

Candidates who, after training, are found suitable will be appointed as System Control Engineers (Grade 4 AX-EX, £763/£1,003) to staff new control centres which are to be set up in the area.

Salary N.J.B. Grade AX-EX.5, commencing within the range £649-£790 per annum, rising to £883 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Secretary, Yorkshire Electricity Board, Wetherby Road, Scarcroft, Leeds, not later than 25th November, 1954.

No. 5 (Wakefield) Sub-Area

CASTLEFORD DISTRICT.

FIRST ASSISTANT DISTRICT ENGINEER. Applicants must have had a sound practical training and considerable experience in all branches of electricity distribution work covering industrial, urban and rural areas with underground and overhead systems. Corporate Membership of the Institution of Electrical Engineers or equivalent qualification is essential.

Applicants must hold a current driving licence and be prepared to reside in the district.

Salary N.J.B. Class F, Grade 5, £791/£818 per annum.

WAKEFIELD, CASTLEFORD AND BARNSLEY DISTRICTS.

GENERAL ASSISTANT DISTRICT ENGINEERS. Applicants must have had a sound practical training with experience in the construction, operation and maintenance of H.V. and M.V. overhead and underground distribution networks, substation plant and ancillary equipment.

Applicants must hold a current driving licence, be prepared to reside in the district to which they are appointed, and undertake standby duties.

Applicants must hold at least the Higher National Certificate in Electrical Engineering.

Salary N.J.B. Class F, Grade 11, £548/£565 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a, Denby Dale Road, Wakefield, not later than 25th November, 1954.

No. 3 (Sheffield) Sub-Area

SHEFFIELD NORTH DISTRICT.

THIRD ASSISTANT DISTRICT ENGINEER. Applicants should preferably have technical qualifications equivalent to Corporate Membership of the Institution of Electrical Engineers, and must have had experience in construction, operation and maintenance of 11-kV and L.V. overhead and underground distribution systems, including substation equipment.

The successful candidate will be expected to organise and control maintenance, supervise construction work, and carry out operational duties on 11-kV and L.V. overhead and underground mains and substations in a district containing a heavy industrial and densely populated residential area surrounded by a rural area.

Salary N.J.B. Class K, Grade 9, £766/£796 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial St., Sheffield, not later than 25th November, 1954.

No. 1 (Bradford) Sub-Area

THIRD ASSISTANT ENGINEER (Meters, Testing and Protection). Candidates should hold at least Graduate Membership of the Institution of Electrical Engineers or equivalent technical qualifications. They should have good experience in the commissioning of new equipment in large substations and in routine testing and maintenance of protective gear. Ability to calculate fault levels, grade protection and undertake cable and fault location, and experience in these matters is desirable. The post may involve a measure of standby availability.

Salary N.J.B. Class K, Grade 10, £719/£750 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 1 (Bradford) Sub-Area, Yorkshire Electricity Board, 45-53, Sunbridge Road, Bradford, not later than 25th November, 1954.

No. 7 (Grimsby) Sub-Area

GAINSBOROUGH DISTRICT.

INSTALLATION ENGINEER. The person appointed will be responsible for the organisation and administration of the contracting section, including the supervision of manual workers. He must be capable of preparing specifications and estimates and supervising schemes for complete installations of all types, and must have a thorough knowledge of the Electricity Supply Regulations and the I.E.E. Regulations for the Electrical Equipment of Buildings. Preference will be given to Corporate Members of the Institution of Electrical Engineers.

Salary N.J.B. Class D, Grade 8, £592/£610 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Road, Grimsby, not later than 25th November, 1954.

No. 6 (Hull) Sub-Area

BRIDLINGTON DISTRICT.

GENERAL ASSISTANT DISTRICT ENGINEER (Driffield). Applicants should hold the Higher National Certificate in Electrical Engineering or equivalent qualifications, and have had experience in the construction, operation and maintenance of E.H.T. and L.T. overhead and underground distribution systems in a mixed urban and rural district.

The successful applicant will be required to reside in Driffield, and may be required to undertake standby duty.

Salary N.J.B. Class D, Grade 11, £500/£516 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Kingston-upon-Hull, not later than 25th November, 1954.

No. 4 (Leeds) Sub-Area

ENGINEERING DRAUGHTSMAN (Electrical). Applicants should be competent draughtsmen with good general and technical education, and should preferably have had experience in the preparation of substation layout and electrical diagrams.

Salary N.J.B. Schedule D, Grade 6, £433/£567 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 4 (Leeds) Sub-Area, Yorkshire Electricity Board, Bramhope, Near Leeds, not later than 25th November, 1954. 6006

COPYWRITER

required in the Publicity Department of a leading Electrical Engineering Company in South East London, to work on descriptive trade catalogues, press advertising and possibly a new house organ. A man between 25/35 preferred. Experience in the electrical industry an advantage.

Write, stating age and experience and salary required, to Employment and Welfare Manager, Johnson & Phillips Limited, Charlton, S.E.7. 6053

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following positions within the Division:—

SHIFT CONTROL ENGINEER NORTHAMPTON POWER STATION. (Vacancy No. 170/54/ER).

Applicants should have a sound technical education and experience in the operation of turbo generators and control room duties.

Salary will be in accordance with National Joint Board Agreement, Class G, Grade 10 (£608-£630 per annum).

Closing date for receipt of applications 22nd November, 1954.

GENERAL ASSISTANT ENGINEER, NOTTINGHAM TRANSMISSION SECTION. (Vacancy No. 171/54/ER).

Applicants should have experience of the maintenance and operation of high voltage overhead lines, transformer and switchgear up to 132 kV and should preferably be Graduates of the Institution of Electrical Engineers.

Salary in accordance with Class AX/DX, Grade 8 (£501-£694 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications 22nd November, 1954.

SECOND ASSISTANT ENGINEER (ELECTRICAL) GENERATION (CONSTRUCTION). (Vacancy No. 173/54/ER).

Preference will be given to applicants who hold a degree in Electrical Engineering, are Corporate Members of the Institution of Electrical Engineers or possess other equivalent qualifications.

They should have had experience in the design and installation of switchgear, transformers and cables up to 33 kV and other electrical equipment associated with modern power stations.

Experience in the preparation of specifications and estimates and preparing reports on tenders will be a recommendation.

Salary will be within Schedule C, Class AX/DX, Grade 2 (£834-£1,053 per annum), of the National Joint Board Agreement.

Closing date for receipt of applications 22nd November, 1954.

These appointments will be pensionable within the terms and provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form, A.E.6/ACT, which may be obtained from the Divisional Establishments Officer, British Electricity Authority, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote Vacancy Number.

L. F. JEFFREY,
Divisional Controller.

5th November, 1954. 6039

EAST MIDLANDS ELECTRICITY BOARD

General Assistant Engineer, Grantham District

APPLICATIONS are invited for the position of GENERAL ASSISTANT ENGINEER in the Mains Department of the Grantham District.

Candidates should have experience of both underground and overhead networks with voltages up to and including 11 kV, and be capable of carrying through distribution schemes from the initial planning stage to final commissioning.

The possession of the Higher National Certificate in Engineering or an equivalent qualification would be an advantage.

Ability to drive a motor vehicle is essential, and the successful applicant will be required to undertake standby duties and to reside in or near to the Borough of Grantham, in which connection a house occupied by an Assistant Engineer will shortly become available.

The salary and conditions of service will be in accordance with the National Joint Board Agreement, Class D, Grade 9/1, namely £561 per annum.

Applications, giving details of age, education, qualifications, experience and position held, should be forwarded to the Sub-Area Manager, Lincolnshire Sub-Area, North House, Grantham, and be received within 14 days of this advertisement. 5981

ELECTRICITY AUTHORITY OF CYPRUS

Resident Engineer
(Transmission Line Construction)

APPLICATIONS are invited for the appointment of a RESIDENT ENGINEER to supervise the construction, by contractors, of extensions to the Authority's 66-kV and 11-kV transmission network. Applicants must be fully experienced in the construction of transmission lines up to and including 66 kV and the handling of contracts. Experience and/or knowledge of maintenance of similar lines would be an advantage, and preference would be given to Corporate Members of the Institution of Civil and/or Electrical Engineers or those holding qualifications exempting them from institution examinations.

The appointment will be on a scale of £1,500-£50-£1,800 per annum, the point of entry into the scale depending on qualifications and experience.

Free quarters with heavy furniture, or an allowance in lieu, will be provided by the Authority.

The appointment will be for a period of two years, terminable by three months' notice on either side. On the completion of the construction work consideration may be given by the Authority to permanent employment in Cyprus.

Free first class passages would be provided for the officer and his family up to three full passages, on first appointment and on termination of the agreement.

Leave on full pay is earned at the rate of 2½ days per month of residence in Cyprus, and may be taken in the United Kingdom on termination of the agreement.

Applications, endorsed "Resident Engineer (Transmission Line Construction), Cyprus," stating age, qualifications and experience, should be forwarded within 14 days of the date of this advertisement to the undersigned, who will communicate with candidates selected for further consideration.

PREECE, CARDEW & RIDER.
8, 10 & 12 Queen Anne's Gate,
Westminster, London, S.W.1. 5941

EASTERN ELECTRICITY BOARD

Fens Sub-Area Headquarters

2nd Assistant Engineer
(Planning and Development)
162/54.R

CANDIDATES should have had a wide experience in the design, layout and operation of urban and rural distribution systems comprising overhead and underground networks (including substations) at voltages up to and including 33 kV. They should be experienced in the preparation of distribution schemes including the technical design, specification and estimates. Corporate Membership of the Institution of Electrical Engineers or the possession of a Degree in Electrical Engineering will be an advantage.

Salary will be in accordance with Class H, Grade 6, of the National Joint Board Salary Agreement commencing at £833, and future salary and conditions of service will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidate will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications by letter stating age, education, qualifications and experience with details of present appointment and salary, should be submitted to the Manager, Fens Sub-Area, Eastern Electricity Board, Milton Hall, Milton, Cambridge, within fourteen days of the appearance of this advertisement.

Previously advertised in September 1954 under reference No. 140/54.R. Applications submitted on that occasion will be automatically reconsidered. 6046

DRAUGHTSMEN

SENIOR CONTRACTS DRAUGHTSMEN required with previous experience of E.H.T. and L.T. switchgear. Pension scheme in operation. Very good salary for right man. Excellent conditions. Apply by letter, giving particulars previous experience, age and salary required, to Erskine, Heap & Co. Ltd., Lancashire Switchgear Works, Manchester, 7. 5825

PROFESSIONAL ENGINEERS IN VARIOUS GOVERNMENT DEPARTMENTS

THE CIVIL SERVICE COMMISSIONERS invite applications for pensionable posts in a wide variety of mechanical and electrical engineering duties.

Candidates must be under 35 on 1st January, 1954, with extension for regular service in H.M. Forces and up to two years for permanent Civil Service. For the Post Office they must be at least 21, for the Ministry of Supply and Ministry of Transport and Civil Aviation at least 23, and for all other Departments at least 25 on that date.

Generally a candidate must possess a university degree in engineering or be a corporate member of one of the professional institutions—Mechanical Engineers, Electrical Engineers or Civil Engineers—or have passes in, or exemption from, Sections A or I and B or II of the corresponding associate membership examinations. Exceptionally, candidates of high professional attainment, but without the specified qualifications, may be admitted. For some posts Associate Fellowship of the Royal Aeronautical Society or an Honours degree in Physics or Engineering will be accepted.

London salary scale (men) £650 (at age 25) to £1,000. Starting salary according to age up to £900 at 34. Candidates entering below age 25 will start at salaries varying from £450 at age 21 to £570 at age 24. Prospects of promotion. Salaries of next higher grades are £1,000-£1,320 and £1,375-£1,575. Somewhat lower for women and in the Provinces.

Further particulars and application forms from Civil Service Commission, Scientific Branch, 30, Old Burlington Street, London, W.1, quoting No. S85/54. Completed applications should be returned as soon as possible and in any case before 31st December, 1954. 5978

POWER PLANT SUPERINTENDENT

APPLICATIONS are invited from suitably qualified persons for the above position on a Northern Rhodesia copper mine.

The installed generating capacity of the station is 45.0 MW, turbo blower capacity 80,000 c.f.m. at 15 pounds per square inch, and installed compressor capacity 54,000 c.f.m. at 90 pounds per square inch.

The boiler plant consists of 11 × 80,000 pounds per hour boilers and 4 × 40,000 pounds per hour boilers. Ten of the 80,000 per hour boilers are associated with reverberatory furnaces and approximately one-third of the steam output of the station is derived from waste heat from the reverberatory furnaces.

Applicants should have had at least eight years' experience in a power station of the same or larger capacity and should have held the position of power plant superintendent or assistant power plant superintendent. Preference will be given to graduate engineers.

The salary will depend on the qualifications and experience of the successful applicant. The starting salary for this position will be at least £120 per month. In addition a cost-of-living allowance is paid plus a cash bonus based on the difference between the production cost and the selling price of copper, at present amounting to 60% of the basic salary.

The Corporation will bear the cost of first class transportation for the successful candidate and his immediate family to Kitwe, Northern Rhodesia.

Housing is provided at nominal rental.

Contributory pension scheme.

Applications, stating age, marital status, qualifications, experience and availability, should be addressed by airmail to the General Manager, Box 137, Kitwe, Northern Rhodesia. 5986

CHIEF PRODUCTION ENGINEER

A PROMINENT manufacturer desires to appoint a CHIEF PRODUCTION ENGINEER with experience of electric lamp or valve manufacture. The position calls for a person having considerable experience in lamp making machinery and manufacturing methods.

Prospects are excellent. A first-rate salary will be paid to the right man and the position is fully superannuated. Own staff are aware of the vacancy.

Applications in full detail to—Box 5965.

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:—

SECOND ASSISTANT ENGINEER (COMMERCIAL), WORCESTER AND DISTRICT SUB-AREA HEADQUARTERS.

Applicants should have experience in the industrial and commercial applications of electricity and installation work. Experience in Air Ministry and other Government contracting work preferable. Technical qualifications desirable. Salary £883/£918 per annum (N.J.B. Grade J. 6). Applications in writing, within 14 days, stating age, qualifications, present position and salary to Mr. R. Mallet, Sub-Area Manager, Midlands Electricity Board, Whittington, Worcester.

GENERAL ASSISTANT DISTRICT ENGINEER, SHREWSBURY DISTRICT, SHROPSHIRE AND HEREFORDSHIRE SUB-AREA.

Experience necessary in all branches of distribution work including operation and maintenance of high and low voltage, underground and overhead distribution systems. Technical qualifications desirable. Salary £555/£569 per annum (N.J.B. Grade E.10). Applications in writing, within 14 days, stating age. experience, present salary and position, to Mr. W. Winwood, Sub-Area Manager, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury.

THIRD ASSISTANT DISTRICT COMMERCIAL ENGINEER, GLOUCESTER DISTRICT, CENTRAL GLOUCESTERSHIRE SUB-AREA.

Duties primarily development of radio and TV sales and service. Experience essential. Technical qualifications desirable. Salary £555/£569 per annum (N.J.B. Grade E.10). Applications in writing, within 14 days, stating age, experience, present salary and position, to Mr. D. Holt, Sub-Area Manager, Midlands Electricity Board, 126, London Road, Gloucester.

A. STEPHENS,
Secretary.
6047

GOVERNMENT OF NIGERIA

Assistant Electrical Engineer,
Railway Department

TO be responsible to the Electrical Engineer for all electrical branches of the department, viz., transformer substation, maintenance and repairs of all electrical equipment in workshops, house wiring and maintenance, train lighting, wharf plant, small power stations at outside depots, and station and yard lighting where provided.

Appointment is either pensionable on probation in the salary range £910-£1,560 per annum gross, or on contract in the range £1,116-£1,898 per annum gross plus a gratuity of £150 per annum payable on satisfactory completion of contract. Free 1st class passages for the officer, his wife, and an annual maintenance allowance of up to £75 each is payable in respect of a maximum of two children. Furnished quarters provided if available at low rental. Leave is granted at the rate of 7 days per completed month of resident service.

Candidates, between 30 and 35, should be Associate Members of the Institution of Electrical Engineers, or have passed or be exempt from Parts A & B of the Institution's examination, and have served an apprenticeship with a reputable electrical engineering firm. They should have had experience in workshops and drawing office with particular emphasis on installation of H.T. and L.T. power equipment and distribution systems, and have had some administrative experience.

Apply in writing to the Director of Recruitment, Colonial Office, Great Smith Street, London, S.W.1, giving briefly age, qualifications and experience. Mention the reference number BCD.110/14/030. 5984

METROPOLITAN-VICKERS ELEC. CO. LTD.

require DESIGN DRAUGHTSMEN for METALCLAD AND HIGH-VOLTAGE SWITCHGEAR DEVELOPMENT. Senior and Junior positions available according to experience.

Applications giving details of experience, age, etc., should be addressed to the Personnel Manager, Metropolitan-Vickers Elec. Co. Ltd., Trafford Park, Manchester, 17. 216

MINISTRY OF EDUCATION: SCIENCE MUSEUM

THE CIVIL SERVICE COMMISSIONERS invite applications for the post of ASSISTANT KEEPER in the Department of Electrical Engineering and Communications. The appointment may be First or Second Class according to age and qualifications.

Age at least 22 and under 26 (26 or over if exceptionally well qualified) on 1st November, 1954, for a Second Class post, with extension for regular Forces Service, compulsory Forces Service and established Civil Service. Prospect of promotion to First Class post by age 30. For direct appointment to a First Class post candidates must be at least 28 on 1st November, 1954.

Candidates must have a First or Second Class Honours degree in electrical engineering, or such equivalent qualification as would be accepted by the Commissioners, and about two years' experience in industry. Knowledge of at least one modern foreign language an advantage.

Salary scale: Assistant Keeper First Class, men £895 - £1,430; women £765 - £1,260. Starting pay at the minimum.

Assistant Keeper Second Class: Men £470-£685; women £470-£580. Starting pay may be increased for approved postgraduate experience and for compulsory service with H.M. Forces.

Particulars and application forms from Civil Service Commission, Scientific Branch, 30, Old Burlington Street, London, W.1, quoting No. S270/54. Application forms to be returned by 14th December, 1954. 5977

THE BRITISH THOMSON-HOUSTON COMPANY LIMITED

has vacancies on its Design and Development staffs at Rugby, Birmingham, Coventry, Leicester and Newcastle-under-Lyme, for ELECTRICAL AND MECHANICAL ENGINEERS with experience in the following fields:—

INDUSTRIAL ELECTRONICS (all modern applications of electronics).

ELECTRICAL MACHINE DESIGN (A.C. and D.C., large, intermediate and fractional h.p. sizes).

INDUSTRIAL APPLICATION OF ELECTRICAL EQUIPMENT (steel works, mining, paper mills, machine tools and other industries).

TRANSFORMER DESIGN (large E.H.T., intermediate and small).

AIRCRAFT ELECTRICAL EQUIPMENT (A.C. and D.C. generators, motors, contactors, starters, etc.).

The openings provide good prospects for young men with technical ability and education in a large rapidly growing industry with ample opportunities for gaining experience in new fields. Young men with honours engineering or science degrees or their equivalents, and engineers with practical mechanical design experience on the drawing board, are required.

Applications should be made to the Chief Electrical Engineer's Department, The British Thomson-Houston Company Ltd., Rugby, together with particulars of technical qualifications, training and experience. 5827

WORKSHOP SUPERVISOR (DIESEL-ELECTRIC AND ELECTRICAL)

required by RAILWAY DEPARTMENT, GOLD COAST LOCAL CIVIL SERVICE, for two tours of 15/18 months each. Consolidated salary in scale £990 rising to £1,230 a year. Gratuity at the rate of £100/£150 a year. Outfit allowance £60. Free passages. Liberal leave on full salary.

Candidates must have served an apprenticeship, preferably on heavy diesel-electric sets, and must have an adequate knowledge of alternators and D.C. motors. They must possess O.N.C. in Mechanical or Electrical Engineering, be able to read and understand drawings and electrical wiring diagrams, and have experience of maintenance in workshops where H.T. current is used. Experience of the running maintenance of diesel-electric sets is most desirable.

Write to the Crown Agents, 4, Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience, and quote M2C/40406/EF. 5940

AIR MINISTRY

MECHANICAL AND ELECTRICAL ENGINEERS required in Works Department for design, operation and maintenance of mechanical and electrical services on R.A.F. stations at home and overseas and Civil Aviation stations.

Appointments in two grades (a) Main Grade, salary scale £1,080 to £1,426; (b) Assistant Grade, £702 to £1,080. Starting pay according to qualifications and experience. Salaries somewhat lower in Provinces. Candidates should be age 25 or over. Appointments temporary and non-pensionable but with long-term possibilities. Special allowance up to £1,500 a year according to location payable in addition to salary during overseas service. Candidates must be natural-born British subjects of natural-born British parents.

Minimum qualifications and experience for both grades of posts: (i) (a) University degree or equivalent diploma in electrical and/or mechanical engineering and at least a two-year apprenticeship, or (b) Graduate or Corporate Membership of the Institutions of Mechanical or Electrical Engineers, with appreciable electrical engineering experience and at least three years' apprenticeship, and (ii) employment in responsible position for minimum of three years with well-established engineering concern providing wide experience in electrical and mechanical engineering practice.

Application forms, quoting ref. D.530/54-A, from M.L.N.S., Technical & Scientific Register (K), Almack House, King Street, London, S.W.1. 204

ENGLISH ELECTRIC COMPANY LIMITED

at STAFFORD have the following vacancies in their METER AND RELAY DEPARTMENTS, in a modern air-conditioned building situated on the edge of beautiful open country, within easy reach of two large Midland cities. Excellent facilities exist for all social and athletic activities.

(1) RELAY ENGINEER with wide experience of protective relays required for senior post in a rapidly expanding department.

(2) A fine career in METER ENGINEERING is offered to a young engineer with ideas and enthusiasm. If without previous metering experience, applicant will be given a twelve months' intensive training course assuming B.Sc., H.N.C., O.N.C. or equivalent qualification.

(3) An equally good opportunity is waiting for a keen young engineer in the protective relay department.

All the posts offered are permanent, progressive and pensionable. Apply to Dept. C.P.S., 336/7, Strand, London, W.C.2, quoting Ref. 1366.

5962

BLACKBURN EDUCATION COMMITTEE

Municipal Technical College and School of Art

Engineering Department

APPLICATIONS are invited for the post of Full-time ASSISTANT to take charge of classes in Electrical Installation up to City & Guilds Courses B & C standard. Applicants should be prepared to offer Electrical Technology, Installation Practice and Regulations. Ability to teach A.C. and D.C. Technology up to S.3 standard will be considered an additional qualification. A degree in engineering or equivalent qualification is desirable, together with satisfactory industrial experience.

The appointment will be Grade B on the salary scale £525-£25-£820 plus the appropriate allowances.

Forms of application may be obtained from the Chief Education Officer, Education Offices, Library Street, Blackburn, and when completed should be returned to him within a fortnight of the appearance of this advertisement. 5985

CITY OF WAKEFIELD EDUCATION COMMITTEE

Wakefield Technical College

Principal: G. N. Blair, M.C., B.Com., A.C.I.S., F.I.I.A.

Appointment of Senior Laboratory Steward

APPLICATIONS are invited for the post of SENIOR LABORATORY STEWARD. Duties will be primarily concerned with the Electrical, Mechanics and Physics laboratories. Salary scale, £375 × £15 (3) × £20 (1) = £440 per annum.

Applications are invited from men who have served an apprenticeship, preferably in some branch of electrical engineering. Previous experience as a laboratory steward, although not essential, is desirable. Experience of storekeeping and of simple maintenance work would be an advantage.

Further information regarding nature of work, hours of duty, superannuation, holidays, etc., may be obtained from the undersigned on receipt of a stamped addressed envelope. Applications should be returned within 15 days of the issue of this advertisement.

C. L. BERRY,
Director of Education.

27, King Street,
Wakefield.
3rd November, 1954. 6035

THE MULLARD RADIO VALVE CO. LTD.

require a PHYSICIST or ELECTRICAL ENGINEER for design and development work on cathode ray tubes for colour television.

Physicists or Engineers who possess a B.Sc. Honours degree and have an interest in electron optics, glass technology or physical chemistry are particularly invited to apply.

The vacancy outlined above is caused by the expansion of the company's activities in this field. Commencing salary will be according to individual age, experience and qualifications and can be considered as progressive.

The company's policy regarding the employment of scientific staff provides adequate prospects for advancement, and breadth of outlook is assured by opportunities for transfer to other fields of work within the company.

There are facilities for further study and a company pension scheme and progressive holiday plan.

Applications in writing will be treated with the strictest confidence and should be addressed to the Personnel Officer, The Mullard Radio Valve Co. Ltd., New Road, Mitcham Junction, Surrey, quoting reference JFG/A.1/M.D.2. 5943

BRITISH ELECTRICITY AUTHORITY

North West, Merseyside & North Wales Division

VACANCY No. 213/54/R, FIRST ASSISTANT STATION CHEMIST, Kearsley Generating Station, Stoneclough, near Manchester. Salary £766/£796 (K.9). Closing date, 1st December.

Vacancy No. 220/54/R, MAINTENANCE ENGINEER (Electrical), Chadderton "B" Generating Station, Nr. Manchester. Salary £787/£818 (G.6). Closing date, 20th November.

Applications, quoting Vacancy No., to Controller, British Electricity House, 825, Wilmslow Road, Manchester, 20. 6038

BRITISH INSULATED CALLENDER'S CABLES LTD.

have the following vacancies for technical staff at their Prescot works and invite applications.

GRADUATE ELECTRICAL ENGINEER for development work on high-voltage cables and accessories.

PHYSICIST for development work covering the design, manufacture and processing of power cables for all voltages.

Applications, quoting reference P/55/54 and giving details of age, qualifications and experience, should be submitted to the Staff Officer, B.I.C.C. Ltd., Prescot, Lancs. 5989

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the following position:—

JUNIOR ENGINEERS (S/13.583).

Applicants should have served an apprenticeship or had practical training suitable to the industry. They should possess a sound general and technical education and preference will be given to those possessing a Higher National Certificate (or those nearing completion of H.N.C. courses). Opportunities are available for junior engineers to complete their studies and gain wide experience with good prospects of promotion.

The duties of those appointed will vary, but will include as a general rule, the operation and control, under supervision, of generating plant.

Vacancies also exist for those who wish to specialise in maintenance of electrical and mechanical generating plant, transmission lines, substations and cables, or generating station construction work.

Commencing salary within range £402-£556 (N.J.B.) depending on qualifications, experience and position to which appointed.

Special application forms obtainable from P. D. A. Oliver, Divisional Secretary, 111, High Street, Portsmouth, should be returned by 24th November, 1954. Please quote ref. E.R. 6043

BRITISH ELECTRICITY AUTHORITY

Yorkshire Division

DEPUTY STATION SUPERINTENDENT required at Skelton Grange Power Station, Leeds.

This station will have an ultimate capacity of 360 MW.

Salary £1,104-£1,156 per annum, Class J, Grade 3, N.J.B. Agreement (Schedule A).

Applicants should have had experience in the operation and maintenance of large modern power station plant, including pulverised fuel fired boilers, have held a position of responsibility involving the control of staff, and should be Corporate Members of the Institution of Electrical and/or Mechanical Engineers.

Application forms obtainable from Divisional Secretary (Establishments), British Electricity House, St. Mary's Road, Leeds, 7, to be returned within 14 days of the appearance of this advertisement.

G. A. VOWLES,
Divisional Controller.
6044

DEPUTY PRINCIPAL

required by the GOVERNMENT TECHNICAL INSTITUTE, BRITISH GUIANA, for appointment on contract for three years in the first instance. Salary equivalent to £1,050 a year (including present temporary allowance of £50 a year). Gratuity at the rate of £225 a year. Free passages. Liberal leave on full salary.

Candidates must hold a C. & G. Full Technological Certificate or H.N.C. in Electrical or Mechanical Engineering or a similar qualification, and have had wide industrial and teaching experience. They must be able to undertake lectures at all levels up to the standard of the H.N.C. and the examinations for the professional institutions.

Write to the Crown Agents, 4, Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience, and quote M2A/30288/EF. 5982

ELECTRICAL ENGINEERS

A WELL-known industrial organisation has vacancies for Electrical Engineers. First-class men, able and willing to shoulder responsibility, are sought, and there are excellent opportunities for advancement. Vacancies exist for men with experience in either power distribution or instrumentation. For the latter type of vacancy applications from physicists will be welcomed. Starting salaries in the range £600-£900 p.a. depending upon qualifications and experience. Postgraduate training leading to professional qualifications can be arranged, and normal salaries will be paid during such training. Candidates should hold an honours degree.

Write, giving full details of age, qualifications and experience, and quoting Ref. U.7, to—Box 5964.

METROPOLITAN WATER BOARD

Appointment of Assistant Engineers (Electrical)

THERE are vacancies for ASSISTANT ENGINEERS (Electrical) on the permanent pensionable staff. Salary scale £760-£30-£940 per annum. Commencing salary according to age and experience. Maximum age 45 years.

It is a condition of the appointment to and the holding of the positions that the selected candidates shall be and continue to be subscribing Corporate Members of the Institution of Electrical Engineers. Housing accommodation may be available, if required, in a good neighbourhood, at an inclusive rent of £130 per annum.

A form of application may be obtained from the undersigned on receipt of a stamped addressed foolscap envelope, quoting reference (G.P.4), and completed applications must arrive not later than 6th December, 1954.

W. S. CHEVALIER,
Clerk of the Board.

Offices of the Board,
New River Head,
Rosebery Avenue,
London, E.C.1. 5848

NORTH EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments in the Chief Engineer's Department, Operation and Maintenance Section:—

GENERAL ASSISTANT ENGINEER, System Protection Sub-Section, with location at Sunderland. Applicants must possess Higher National Certificate in Electrical Engineering or its equivalent. Salary Schedule C, Grade 8, £501/£694. N.J.B. conditions of service.

ARCHITECTURAL DRAUGHTSMAN, with location at Carliol House, Newcastle upon Tyne. Applicants should have had a sound technical education and practical experience in the layout and design of buildings, reinforced concrete structures, piled and slab foundations for components, and the preparation of detailed drawings. Salary Schedule D, Grade 4, £671/£780. N.J.B. conditions of service.

Applications, stating age, qualifications and experience, should be forwarded to the Secretary (Establishments), North Eastern Electricity Board, P.O. Box No. 117, Carliol House, Newcastle upon Tyne, within ten days of the appearance of this advertisement. 6003

SENIOR SALES APPOINTMENTS

THE BRUSH ELECTRICAL ENGINEERING CO. LTD. has several vacancies for SENIOR SALES ENGINEERS to reinforce its Sales Division due to expansion. These appointments call for responsible senior men capable of working on their own initiative, and there are excellent opportunities for promotion to higher executive posts.

Applicants should preferably be Corporate Members of the I.E.E., but candidates without this qualification but with suitable experience of sales engineering will also be considered. There are attractive conditions of employment, including staff bonus and non-contributory superannuation.

Replies to the Chief Personnel Officer, Brush Electrical Engineering Co. Ltd., Loughborough, Leics. 5963

ELECTRICAL ENGINEER

APPLICATIONS are invited from ambitious Electrical Engineers under 30 years for the post of DESIGN ENGINEER (Electrical) at Davy and United Engineering Company Limited, manufacturers of hot and cold rolling mills, presses, etc. A knowledge of rolling mill electrical equipment and experience with a large electrical manufacturers desirable. Minimum qualification, Higher National Certificate. Applications, stating age, qualifications, experience and salary required, should be sent to — Personnel Officer, Davy and United Engineering Company Ltd., Park Iron Works, Sheffield, 4. 5942

Nottinghamshire Education Committee

MANSFIELD TECHNICAL COLLEGE

Principal: R. F. Beaton, B.Sc.(Eng.), Wh.Sch.

APPLICATIONS are invited for the post of ASSISTANT Grade B in Electrical Engineering subjects. Applicants will be expected to teach to the level of the Higher National Certificate, and should hold suitable qualifications. Adequate industrial experience is expected, and preferably some experience of teaching.

The salary is in accordance with the Burnham Technical Scale for Assistants Grade B, £525 × £25 to £820 per annum. Additions may be made to the scale for certain qualifications and study training. The position on the scale is determined by previous teaching and industrial experience.

Forms of application may be obtained from the Divisional Education Officer, Education Office, Market Place, Mansfield, to whom they should be returned within two weeks of the appearance of this advertisement.

J. EDWARD MASON,
County Hall, Director of Education.
Nottingham.
1st November, 1954. 5960

AUTOMATIC TELEPHONE & ELECTRIC CO. LTD., LIVERPOOL, 7

Communication Engineers and Draughtsmen

THE expanding programme of the Transmission Department offers vacancies in both senior and junior categories for LINE TRANSMISSION LABORATORY ENGINEERS and APPARATUS DESIGN ENGINEERS, and also for DRAUGHTSMEN with experience in telecommunications or light current engineering.

Specialist experience in any branch of line transmission engineering is desirable for some of the posts.

Positions offered are on the company staff with contributory pension fund and usual staff conditions.

Applicants should write to Personnel Manager, Automatic Telephone & Electric Co. Ltd., Strowger Works, Edge Lane, Liverpool, 7, giving full details of age, qualifications and experience.

209

EAST MIDLANDS ELECTRICITY BOARD

Third Assistant Engineer, Operation, Maintenance and Testing, Lincolnshire Sub-Area Headquarters

APPLICATIONS are invited for the position of THIRD ASSISTANT in the Engineering Department of the Lincolnshire Sub-Area Headquarters.

Candidates should have a good technical training and practical experience in the operation of urban and rural distribution systems up to and including 33 kV, and a general knowledge of maintenance of switchgear, transformers and auxiliary equipment. The duties will include fault location, and experience of this will be an added advantage.

The commencing salary and conditions of service will be in accordance with Class H, Grade 11/1 (£607-£628).

The ability to drive a motor vehicle is essential and the person appointed will be required to reside in or near Grantham.

Applications, giving details of age, education, experience and qualifications, should be forwarded to the Sub-Area Manager, North House, Grantham, and be received within 14 days of this advertisement. 5980

SENIOR DEVELOPMENT ENGINEER

having experience in the design and manufacture of fractional horsepower and fan induction motors is required by progressive firm for design office in central Glasgow. Applications are invited in strictest confidence. Assistance will be given for suitable applicants requiring housing accommodation. Conditions include 5-day week and pension and life assurance scheme. Apply giving details of age and experience, qualifications and salary to—Box 6050.

SOUTH EASTERN ELECTRICITY BOARD

THIRD ASSISTANT DISTRICT ENGINEER, Lewes District.

Salary £561-£578 p.a. under N.J.B. Class D, Grade 9. Superannuable. Applicants should be suitably qualified and have had training and experience in the construction, operation and maintenance of underground and overhead distribution systems up to and including 33 kV. Experience of D.C./A.C. changeover an advantage.

Applications, naming 2 referees, to G. R. Lincoln, A.I.E.E., SEEBoard, 80/81, High Street, Lewes, Sussex by 24th November, 1954.

METER TESTER ASSISTANTS, Croydon and W. Kent Sub-Area Meter Department.

Wages 3s. 8½d. per hour, for a 44-hour, 5-day week, under N.J.I.C. Agreement. A knowledge of meter or instrument work an advantage but applications will be considered from persons willing to be trained in meter repair and testing work.

Applications, naming 2 referees, to T. A. D. Honnor, M.I.E.E., Croydon and W. Kent Manager, SEEBoard, Electric House, Wellesley Road, Croydon by 24th November, 1954.

A. L. BURNELL,
Secretary.
6034

CITY OF PORT ELIZABETH

Electricity Department

Vacancy for Meter Mechanician and Tester

APPLICATIONS are invited for the permanent position of METER MECHANICIAN AND TESTER at a rate of pay of 3s. 11d. per hour, plus cost-of-living allowance, which is at present 68s. per week for single employees and 101s. 6d. per week for married employees. In addition, merit pay will be payable in terms of the conditions of service.

Applicants must be fully experienced and be capable of testing and calibrating polyphase kWH, kVA and M.D.I. meters, standardisation of instruments and transformers, and be thoroughly familiar with the general routine in the meter department of a modern electricity supply undertaking.

Further details regarding leave, merit pay, pension fund, etc., can be obtained from Davis & Soper Ltd., 52 & 54, St. Mary Axe, London, E.C.3.

G. H. BREWER,
Town Clerk.
1st November, 1954. 5979

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Aberdeen Area

Staff Vacancy, Second Assistant Engineer (Mains)

THERE is a vacancy in the Aberdeen Area for a SECOND ASSISTANT ENGINEER with N.J.B. grading of F/7 (£697-£718).

Written applications should be addressed to the undersigned before 24th inst.

The duties of the successful applicant will be the maintenance of electrical equipment in 33 kV, 11 kV and 6.6 kV substations throughout the Area, and eventually taking part in a rota of standby duty in the Aberdeen City (No. 2 District) in accordance with N.J.B. arrangements. Applicants must have had a recognised apprenticeship and be technically qualified, in addition to the necessary experience.

J. E. WHITTAKEA,
Area Offices, Area Manager.
Millburn Street,
Aberdeen. 6037

PRODUCTION ENGINEER

required by a prominent group with electrical and mechanical subsidiaries in the North West of England. This is a senior appointment and candidates must have had a wide experience in design considerations in relation to repetitive production, preferably in the electrical industry.

The position is permanent and pensionable with a starting salary of not less than £2,000 p.a. with considerable opportunity for further advancement.

Please apply giving full details of age, education, training, and experience, to Box 2J. L5128, A.K. Advertising, 212a, Shaftesbury Avenue, London, W.C.2. 6048

UGANDA ELECTRICITY BOARD

APPLICATIONS are invited for the following appointment on the permanent staff: CABLE JOINTER with experience in the laying and jointing of underground cables of all types on system voltages up to and including 11 kV. Single man preferred. Starting salary according to experience in the scale of £783 per annum rising to £1,053 per annum, including a variable cost-of-living allowance which is at present 35%.

Free partly furnished accommodation is provided. Free medical and dental treatment. Three-year contract in the first instance with free passages to and from Uganda up to a maximum of three adult fares. Vacation leave on full pay.

Uganda has a pleasant and healthy climate, while taxation is not high.

Application forms and further information may be obtained from the Board's London Office at 27, Regent Street, London, S.W.1. Applications to reach London Office by 27th November, 1954.

C. R. WESTLAKE,
Chairman. 5987

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable post. Conditions of service in accordance with N.J.B. Agreement, Schedule A. Salary includes London allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. an advantage.

SHIFT CHARGE ENGINEER, TAYLORS LANE GENERATING STATION. Vacancy No. 54/934. Sound electrical and mechanical training necessary with experience in efficient operation of a generating station. Character and ability to deal with staff problems is important. Salary Class F, Grade 7 = £731 17s. p.a.

Applications, quoting vacancy number, may be made on form obtainable from Divisional Secretary, British Electricity Authority, London Division, P.O. Box 136, Generation House, Great Portland Street, London, W.1, and be received within 14 days of this advertisement. 6005

COUNTY BOROUGH OF BURNLEY: EDUCATION COMMITTEE

Burnley Municipal College Engineering Department

APPLICATIONS are invited for the post of LECTURER in Electrical Engineering subjects in the Ordinary and Higher National Certificate Courses.

Candidates should possess an Honours Degree in Electrical Engineering and should have had appropriate industrial and/or teaching experience.

Salary in accordance with the Burnham Technical Award 1954 Scale for Lecturers, £965 × £25 to £1,065.

Application forms obtainable by sending a stamped addressed foolscap envelope to the Director of Education, Education Offices, Burnley, by whom completed forms should be received not later than 10 days after the issue of this advertisement.

C. V. THORNLEY,
Town Clerk. 5961

BRITISH ELECTRICITY AUTHORITY

Midlands Division

STATION SHIFT CONTROL ENGINEERS (5) are required at Meaford "B" Power Station, near Stone, Staffordshire. N.J.B. service conditions, superannuable appointments, salaries within Schedule "A" of the Agreement, commencing on Grade G.10, £608 per annum. The Station ultimate classification is "J."

A sound technical training and practical experience in the control and operation of a modern power station are required. Appropriate technical qualifications an advantage.

Apply, quoting Vacancy No. 808.MD on form A.E.6, available from the Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13, by 27th November, 1954. 6040

THE UNIVERSITY OF MANCHESTER

APPLICATIONS are invited for the following appointments in the DEPARTMENT OF ELECTRICAL ENGINEERING:—SENIOR LECTURER, LECTURER, and ASSISTANT LECTURER.

Candidates should have experience in one or more of the following fields: High Voltage, Electrical Machines, Electronics. One of the persons appointed will be required to take charge of a new High Voltage Laboratory operating up to 1 million volts D.C. and impulse.

Salary scales per annum: Senior Lecturer, £1,150 to £1,500; Lecturer, £500 to £1,000; Assistant Lecturer, £450 to £550. Membership of F.S.S.U. and children's allowance scheme.

Applications should be sent not later than 30th November, 1954, to the Registrar, The University, Manchester, 13, from whom further particulars and forms of application may be obtained. 6002

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Northern Area

APPLICATIONS invited for post of ASSISTANT DISTRICT ENGINEER in the Ross-shire and Sutherland Area. Applicants should preferably be Corporate Members of the Institution of Electrical Engineers or hold equivalent qualifications, and should have had training in operation and maintenance of H.V. and L.V. overhead lines in a rural distribution area.

Salary £587-£649 (N.J.B. Grades E.9/7), depending on qualifications and experience. Superannuation scheme applicable. Application form obtainable from the undersigned, to be returned within 14 days of the publication of this advertisement.

R. B. ANDERSON,
Church Street, Area Manager.
Dingwall. 5988

CHIEF DESIGNER

required by a group of electrical manufacturing companies in the North of England. This is a senior executive appointment and candidates must have originality, organising ability and drive.

The successful applicant must be capable of building up a design staff ab initio and should preferably have experience in the design of contactors, overload protective devices, etc., and electrical equipment generally.

The position is permanent and pensionable and carries a commencing salary of £2,000 per annum with considerable opportunities for the future.

Please apply giving details of age, education, training and experience, to Box 2J. L5119, A. K. Advertising, 212a, Shaftesbury Avenue, London, W.C.2. 6049

MUIRHEAD & CO. LTD., BECKENHAM, KENT

Design Draughtsmen

EXPANDING programme offers vacancies for both senior and junior design draughtsmen with experience of light electro-mechanical apparatus.

The work covers a wide range of developments and the positions offer ample scope for persons with initiative and ability. Salary according to qualifications and experience.

Apply by letter, stating details of age, training and experience, to—Personnel Manager. 6054

ELECTRICIAN/WIREMAN

required by the FALKLAND ISLANDS GOVERNMENT for one tour of three years in the first instance. Rate of pay 3s. 7d. an hour plus cost-of-living bonus at present 8d. an hour; 45-hour week with ample opportunity for overtime at increased rates. Free return passages. Leave on full pay.

Candidates, unmarried, must be capable of wiring domestic and small factory installations and undertaking L.T. overhead lines erection and maintenance.

Write to the Crown Agents, 4, Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience, and quote M2A/40512/EF. 5983

SWITCHGEAR DRAUGHTSMEN FOR SOUTH AFRICA

(1) CHIEF DRAUGHTSMAN. Candidates must have good technical and practical qualifications, in addition to experience with a leading switchgear manufacturer both in design and contract work.

(2) SENIOR SWITCHGEAR DRAUGHTSMAN. Candidates must have good technical and practical training in addition to experience with leading switchgear manufacturers. Some experience in switchgear design is essential.

These appointments are for permanent situations at Switchgear Works in South Africa where switchgear up to 11,000 volts is manufactured and enquiries for gear up to 66,000 volts are handled. Preference will be given to men between 28 and 38 years of age. Salaries will be in accordance with qualifications and experience and good bonus and life assurance schemes are in force.

Box 6052.

ADMIRALTY— ROYAL NAVAL SCIENTIFIC SERVICE

SENIOR SCIENTIFIC OFFICERS and SCIENTIFIC OFFICERS required in Experimental Establishments in London, Portsmouth, Weymouth and Gloucestershire areas and Scotland. The majority of the posts are for Engineers and Physicists (particularly with Electronics).

Candidates must be British subjects with an appropriate first or second class honours degree or equivalent high professional attainments.

Salaries: S.S.O. (M) £975-£1,150; S.O. (M) £470-£855. London rates. Somewhat lower in Provinces. All appointments are unestablished (with F.S.S.U.), but with some opportunities to compete for established posts.

Application forms from M.L.N.S., Technical and Scientific Register (K), 26, King Street, London, S.W.1, quoting A.246/52/A. 207

FERRANTI LTD. TRANSFORMER DEPARTMENT

have vacancies in their Research and Development Sections for:—

(1) SENIOR ENGINEERS with 1st or 2nd Class Honours Degrees in Electrical Engineering and with previous experience of research and development work in power engineering. The work would be concerned with transformers, voltage regulators, and specialised high-voltage equipment. Ref. T.S.E.

(2) JUNIOR ENGINEERS of approximately H.N.C. standard for work in the same fields. Ref. T.J.E.

Permanent staff appointments with pension benefits.

Application forms from Mr. T. J. Lunt, Staff Manager, Ferranti Ltd., Hollinwood, Lancs. Please quote appropriate reference. 5852

SOUTH WESTERN ELECTRICITY BOARD

DEMONSTRATOR, BARNSTAPLE DISTRICT. Salary, N.J.C., Grade 1, £400-£490 per annum.

Duties include public demonstrations of cooking and electrical appliances, and advice generally on their use. Candidates should possess recognised domestic science qualification, with preferably E.A.W. Electrical Housecraft Certificate.

Application forms obtainable from the Manager, Barnstaple District, Cross Street, Barnstaple, should be returned by 27th November. 6036

NORTHAMPTON POLYTECHNIC, LONDON, E.C.1

Department of Electrical Engineering

REQUIRED a GRADE III LABORATORY TECHNICIAN for development and construction of electrical computing apparatus. The duties initially will be entirely confined to this work and the post will provide valuable experience and training in this important field. Day off a week to attend classes leading to H.N.C or Degree in Electrical Engineering. Salary, age 16, £3 13s. 6d. p.w. to £401 p.a. at approx. age 26, plus supplement for certain qualifications. Apply with full particulars to Secretary. 6033

BRITISH ELECTRICITY AUTHORITY

Midlands Division

SECTION LEADER (Mechanical Draughtsman) is required in the Generation (Construction) Department at Divisional Headquarters, Birmingham. N.J.B. service conditions, superannuable appointment, salary within Schedule "D" Grade 3, of the Agreement, £780 to £884 per annum.

Applicants should preferably have experience in the design and layout of power station plant, including boilers, turbo-alternators and ancillary equipment; high and low pressure steam and feed pipework; condensing plant and feed heating systems. Appropriate technical qualifications an advantage.

Apply on form A.E.6, quoting vacancy number 811.MD, to the Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13, by 27th November, 1954. 6041

COMMUNICATION ENGINEERS AND DRAUGHTSMEN

THE expanding programme of the Transmission Department offers vacancies in both senior and junior categories for LINE TRANSMISSION LABORATORY ENGINEERS and APPARATUS DESIGN ENGINEERS, and also for DRAUGHTSMEN with experience in telecommunications or light current engineering.

Specialist experience in any branch of line transmission engineering is desirable for some of the posts.

Positions offered are on the company staff, with contributory pension fund and usual staff conditions.

Applicants should write to Personnel Manager, Automatic Telephone & Electric Co. Ltd., Strowger Works, Edge Lane, Liverpool, 7, giving full details of age, qualifications and experience. 6008

BRITISH ELECTRICITY AUTHORITY

South Western Division

GENERAL ASSISTANT ENGINEER required in the Technical Department (Plymouth Region). Superannuation scheme. Salary N.J.B. Class AX/CX, Grade 8, £501-£675 p.a.

Applicants should possess qualifications leading to A.M.I.E.E. and have served with one of the leading electrical manufacturers. They should have an interest in protective gear design and generator and switchgear testing.

Applications on form A.E.6/ACT, obtainable from the Divisional Secretary, 26, Oakfield Rd., Bristol, 8, should be completed and returned by 22nd November, 1954.

Previous applicants need not re-apply. 6004

RADIO MECHANIC

required for the BERMUDA POLICE FORCE in the rank of Constable for a tour of 5½ years with possibility of permanency. Salary scale (including present temporary allowance of 10% of salary) £715 rising to £825 a year. Free passages and uniform. No income tax.

Candidates must be unmarried, between 21 and 28 years of age, of sound physique and good education. They must be familiar with signal generator, valve tester, anometer and battery charger equipment, and also VHF equipment similar to Pye Series PTC704 (fixed unit) and Pye Series PTC115 (mobile units).

Write to the Crown Agents, 4, Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience, and quote M1/36551/EF. 5959

BRITISH ELECTRICITY AUTHORITY

RESEARCH LABORATORIES, Leatherhead, require TWO GENERAL ASSISTANT ENGINEERS.

Candidates should have a University degree or equivalent qualifications in Electrical Engineering or in Physics. Duties include research on electrostatic precipitation and allied problems at Leatherhead and Croydon Laboratories.

Salary N.J.B. Grade 5, £531-£732 p.a.

Applications stating age, qualifications, experience and present position and salary should be forwarded to D. Moffat, Director of Establishments, Winsley Street, London, W.1, by 26th November, 1954. Quote reference ER/541. 6068

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the following positions in the Generation (Operation) Department at Hams Hall A Power Station, near Birmingham. N.J.B. Service Conditions, superannuable appointments, salaries within Schedule A of the Agreement:—

(a) ASSISTANT MAINTENANCE ENGINEER (Electrical), Grade J8, commencing at £764 per annum. (Vacancy No. 809.MD).

(b) BOILER HOUSE SHIFT CHARGE ENGINEER, Grade J9, commencing at £719 per annum. (Vacancy No. 810.MD).

Applicants for these positions should have received a sound technical training and practical experience, in particular for (a) in power station electrical maintenance, and for (b) in the control and operation of steam generating plant, including pulverised fuel fired boilers, and main switchgear. Appropriate technical qualifications an advantage.

Apply, quoting vacancy number, on form AE.6, available from the Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13, by 27th November, 1954. 6042

BRITISH ELECTRICITY AUTHORITY

Southern Division

S/13.584

APPLICATIONS are invited for the following position:—

STATION SUPERINTENDENT, PORTSMOUTH GENERATING STATION.

Applicants should have received a thorough technical and practical training followed by wide experience in the operation and maintenance of generating station plant and have also held a position of responsibility involving the control of technical and administrative staffs. Preference will be given to corporate members of one of the senior professional engineering institutions, or those holding similar qualifications.

Salary N.J.M., Grade 1, £1,150-£1,300.

Special application forms, obtainable from P. D. A. Oliver, Divisional Secretary, High Street, Portsmouth, should be returned by 24th November, 1954. Please quote reference E.R. 6045

A SENIOR ASSISTANT ELECTRICAL ENGINEER is required for work on a site in the Home Counties, to take up duty not later than 1st January, 1955. Not less than 35 years of age and holding technical qualifications not less than Higher National Certificate. Must have had wide experience on large power plant construction.

TWO ASSISTANT ELECTRICAL CONTRACT ENGINEERS required. Aged 25-30 years and holding B.Sc. or other recognised electrical degree. Must have had at least two years' practical experience since qualifying, preferably on large power plant construction.

Apply Personnel Officer, Ewbank & Partners Ltd., 10/11, Grosvenor Place, London, S.W.1 (near Hyde Park Corner). 6007

RE ELECTRICAL ENGINEER SURVEYOR

DUE to a typographical error the advertisement of the General Accident Fire & Life Assurance Corporation Ltd. which appeared in the issue of 22nd October showed a salary limit other than the scale agreed between the Engineer Surveyors Association and the Insurance Companies. 5944

A LARGE industrial organisation has a vacancy for an electrical draughtsman at their head office in London. Some knowledge of electrical circuits for power and lighting installations and electrical plant layout in factories is desired, also the theory connected with such installations. Aged 22/26. Reply in the first instance, stating education, age, experience and salary required, to—Box A.L.4093, A.K. Advg. Ltd., 212a, Shaftesbury Ave., London, W.C.2. 6010

ALLEN WEST & Co. Ltd., Brighton, 7, require experienced men for their engineering department. Must have had experience with electrical control gear manufacturers and be capable of engineering control schemes involving contactor type gear for all industrial applications. Replies, with technical qualifications and salary required, to—Mr. E. S. Heathcote. 7724

A LEADING cable manufacturer in North London has a vacancy in the test and research department for a junior draughtsman. The work involves the design and development of accessories for use with high-voltage cables. A knowledge of electrical engineering would be an advantage. Previous experience not essential. Applicant should have completed his National Service. Salary in accordance with A.E.S.D.—Box 5839.

A STAFF foreman required for overhead line erection contracts in Northern England. Salary and incentive bonus paid. Out allowance paid. Only fully experienced men used to working on own initiative.—Box 7718.

ACCOUNTS clerk required, experienced in the making up of electrical accounts. Hours 9.30 to 5.30, no Saturdays. Pension scheme. Write, giving details of experience and present salary, to the Secretary, Drake & Gorham (Contractors) Ltd., 36, Grosvenor Gardens, London, S.W.1. 6078

AN attractive career is available to young men of good education and training with the personality required for success in selling rotating electrical machinery up to 1,000 h.p. Necessary qualifications are Ordinary National Certificate in Electrical Engineering and some practical experience in the manufacture, repair or installation of industrial motors and generators. Pension scheme and bonus on results. Applications, giving full details of age, education, training, experience and salary required, to—Higgs Motors Ltd., 109, Kingsway, London, W.C.2. 6009

AN old-established engineering company in the Birmingham area has a vacancy for a young man (aged 25/27) for training as a service engineer on their outside staff. National Service must have been completed. Apprenticeship and actual industrial experience in electrical or electronic work with emphasis on fault finding and testing of production equipment necessary. Very good prospects to successful candidate. Apply giving full details of experience, age and wages required to Box 5945, quoting "Service."

AN opportunity occurs in progressive manufacturing concern in London area for engineer aged 25/35, with electrical or physicist degree, on development and research work on high-frequency telecommunication cable and associated testing equipment. Salary will be commensurate with qualifications and experience. Apply giving full particulars to—Box 6011

ARMATURE winder required, excellent conditions and rates, 20 mins. from Waterloo. —Max Arc & Electrics Ltd., Terrace Road, Walton-on-Thames, Surrey. 170

ARMATURE winders urgently required. Top rates paid for the right men. Apply—Collins Electrical Ltd., 22, St. Albans Place, Upper Street, Islington, London, N.1. 5991

ASSISTANT plant engineer with mechanical/electrical experience required by South Midlands manufacturers of electrical appliances. M.D. 2,000 kVA. Apply with full details of previous experience and past positions held, salary required and present domestic circumstances to—Box 5946.

BRANCH manager required for electrical contracting business in Surrey. Must be able to organise showroom sales and handle contracting. Apply stating age, experience and salary required, to—Box 5912.

BRITISH INSULATED CALLENDER'S CABLES Ltd. have a vacancy with their telecommunications laboratory at Kirkby for an honours graduate in physics or electrical engineering to take charge of a small but growing team engaged on the design of accessories for audio, carrier and V.H.F. cables and the development of pneumatic protection for underground cables. Applications, quoting reference P/58/54, should be submitted in writing to—The Staff Officer, B.I.C.C. Ltd., Prescot, Lancs. 5990

CHEMIST required by a firm of electric cable manufacturers in the North-East area. Experience in rubber cable manufacture preferred but not essential. Superannuation fund and 5-day working week. Reply stating age, experience and salary required to—Box 5994.

CHIEF draughtsman required by well-established company in North London area. Must have experience in design of distribution transformers up to 500 kVA. Excellent conditions; group assurance scheme. Write stating age, experience and salary required to—Box 5757.

CHIEF draughtsman required by electrical engineering firm in Glasgow area due to expansion of drawing office. Previous experience of F.H.P. induction motors and light electro-mechanical relays desirable. Conditions include 5-day week and pension and life assurance scheme. Assistance will be given for suitable applicants requiring housing accommodation. Applications in strictest confidence. Apply, giving details of age, experience, qualifications and salary, to—Box 6051.

CONTRACT estimator required for handling enquiries for the supply and installation of electric cables for voltages up to 132 kV. 5-day week. Pension scheme. Apply giving full details of past experience to—The Secretary, W. T. Glover & Co. Ltd., Trafford Park, Manchester, 17. 6014

CONTRACTS engineers required for handling of switchgear tenders and contracts. Applications should state age, experience, qualifications and salary required, and should be addressed to—Personnel Manager, South Wales Switchgear Ltd., Blackwood, Mon. 5997

CROMPTON PARKINSON Limited invite applications for posts as instrument salesmen. Applicants should be engineers with sound knowledge of the electrical industry, and preference will be given to those with experience in the instrument side of the industry. A period of training will be given to successful applicants. Excellent conditions, superannuation scheme and other amenities. Applications in full details should be addressed to — Ref. MD/P(J), Crompton House, Aldwych, London, W.C.2. 5947

DESIGN draughtsman. A vacancy exists in our design drawing office for a first-class designer for interesting work in connection with the development of automobile electrical equipment. He should be at least of H.N.C. standard and experience in the design of light electrical equipment for large quantity production would be an advantage. A good starting salary will be paid and the position provides excellent scope for advancement. In addition, design and detail draughtsmen are also required for the design of aircraft and automobile wiring systems, and applicants for these positions should have experience in the layout of electric circuits. Please reply stating age, qualifications and experience to—Personnel Manager, Joseph Lucas (Electrical) Ltd., Great King Street, Birmingham, quoting ref. PM/D/41. 143

DESIGN draughtsman required for work on light electrical mechanisms or instruments. H.N.C. preferred. Pension scheme, canteen. Write in tabulated form to—Personnel Manager, Dowty Equipment Ltd., Arle Court, Cheltenham. 5692

DESIGN draughtsmen required for large A.C. and D.C. machines including turbo and waterwheel alternators. Applications from men with suitable technical qualifications and good general mechanical drawing office experience will be considered. Apply, giving full details of qualifications, experience and salary required, to the Staff Manager, The General Electric Co. Ltd., Witton, Birmingham, 6. 6055

DESIGN engineer required by consulting engineers for preparation of electric light and power schemes and specifications for all types of buildings. Previous experience essential. Write, stating age, experience and salary required, to—E. Wingfield-Bowles & Partners, 32, Old Queen Street, Westminster, London, S.W.1. 156

DESIGNER-draughtsman for small accessories, state electrical qualifications and experience to—Wandsworth Electrical Manufacturing Co. Ltd., Sheerwater, Woking, Surrey. 5914

DEVELOPMENT engineer required for small factory in S.E. London for work on light electrical mechanisms. Additional experience on electronics and/or relay circuits might be useful.—Box 5948.

DRAUGHTSMAN required by consulting engineers for the reproduction of electric light and power schemes. Previous experience essential. Write, stating age, experience and salary required, to—E. Wingfield-Bowles and Partners, 32, Old Queen Street, Westminster, London, S.W.1. 157

DRAUGHTSMAN required (London, Victoria area) for manufacture of L.T. switchgear and general engineering. Prospects for man with initiative. Write age, experience and salary required.—Box 6056.

DEVELOPMENT engineer required for interesting and important work in the electrical machine division of the Brush Electrical Engineering Co. Ltd. Applicants should be capable of working on their own initiative and should possess an honours degree. Preference will be given to those with experience on this type of work. Conditions include staff bonus and non-contributory superannuation scheme. Applications to — Chief Personnel Officer, Brush Electrical Engineering Co. Ltd., Loughborough, Leics. 5885

DRAUGHTSMAN, senior engineering, capable electrical layouts, required by large London firm engineers. Write age, salary, references.—Box 5870.

DRAUGHTSMEN required for mechanical design of compressed air components. Some mechanical experience essential. Applications giving details of experience, age, etc., should be addressed to—Personnel Manager, Metropolitan-Vickers Elec. Co. Ltd., Trafford Park, Manchester, 17. 217

ELECTRICAL circuit draughtsman for manufacturer of automatic temperature controls. Permanent pensionable post for man up to 50 years old. Written applications to —DHS, The Rheostatic Company Limited, Slough, Bucks. 5971

ELECTRICAL contractor, old-established, Birmingham, requires estimating and supervising engineer. Experience in good-class commercial and industrial installations; must be capable of supervision to final invoice. Reply in confidence, stating age, experience and salary. —Box 7722.

ELECTRICAL contractors in Westminster require estimating/supervising engineer experienced in good installations. Apply, giving details of experience, age and salary required.—Box 5920.

ELECTRICAL engineer required in design and equipment work on light electrical mechanism for railway signalling. Candidates should have served an apprenticeship, but no other experience is essential. The minimum qualifications, H.N.C. or equivalent. Age not more than 28. Five-day week and staff pension scheme. Apply to—Personnel Superintendent, Westinghouse Brake & Signal Co. Ltd., Chippenham, Wilts. 5857

ELECTRICAL engineer wanted as export manager with experience in documentation and shipping and a good knowledge of German. Salary according to qualification. Wanted as soon as possible for London (City) office.—Box 7725.

ELECTRICAL engineering assistant required by leading cinema circuit. Experienced in good quality L.V. installation work, with some experience of D.C. and A.C. machines and rectifiers up to 50 kW. Applicants should preferably be of H.N.C. standard.—Box 5967.

ELECTRICAL engineering graduate, age 28-35, required as assistant in the Geneva office of the International Electrotechnical Commission. Administrative duties and French-English translation work. Good knowledge French essential. Commencing salary Sw.Frs. 1,500 a month. Pension scheme.—Box 5966.

ELECTRICAL fitters required. Top rates paid for the right men. Apply—Collins Electrical Ltd., 22, St. Albans Place, Upper Street, Islington, London, N.1. 5992

ELECTRICAL testing laboratory requires an experienced electrician to be responsible for the electrical installation and equipment and to assist in the construction of experimental testing machines. Apply, giving details of experience, to — E.D.A. Testing House, Cleeve Road, Leatherhead. 5949

ELECTRICAL wholesalers require pricing clerk for London office of established and expanding business. Applications in writing to Secretary, Simpson, Baker & Co. Ltd., 24/30, Gillingham Street, London, S.W.1, giving full details of experience and salary required. 5993

ENGINEER required for experimental and development work on universal motors and domestic appliances. The work also involves some knowledge of airflow measurement and electronics, but versatility and ability to develop new ideas are of first importance. Applicants should have Higher National Certificate (Elect.) or equivalent, and preferably served an apprenticeship. Age 24 to 32. Write giving details of age, education and experience to—The Employment Officer, Hoover Limited, Perivale, Greenford, Middlesex. 5873

ELECTRICAL wholesaler requires the following additional staff: Order clerk, also pricing clerk; knowledge of trade essential. Storesman with good knowledge of electrical equipment.—London Electrical Co., 92, Blackfriars Road, London, S.E.1. 5871

ELECTRONIC engineer required for research and application of electronics to vibration and stress problems. Young engineers with good academic qualifications and some experience of this type of work are invited to apply for this post. Excellent conditions include a non-contributory staff pension scheme, and there are first-class prospects for the right man. Please apply with full details of qualifications, experience, etc., to—The Chief Personnel Officer, Brush Electrical Engineering Co. Ltd., Loughborough, Leics. 5885

ENGINEER, aged 25 to 35, preferably having Higher National Certificate, required for the maintenance of electronic equipment and the testing and alignment of new instruments used for quality control and automatic testing of all types of telecommunication cables. Apply giving full particulars to—Box 5741.

ENGINEER required for operational tests, maintenance and development of airborne electronic equipment. Degree, H.N.C. or equivalent, with some practical experience of electronic equipment desirable. Must be British or Commonwealth subject. Apply—Construction Department, British Thomson-Houston Co. Ltd., Rugby. 6057

ENGINEER required for the development of a wide range of fractional horse-power motors. Experience of this work and H.N.C. (elect.) or equivalent essential. Salary approximately £700 to start. Candidates, aged 25 to 35, should apply in writing, stating age, education, qualifications and experience, to—The Employment Office, Hoover Limited, Perivale, Middx. 5968

ENGINEERING laboratory assistant required for the development of a wide range of electrical test equipment. Salary minimum £11 5s. per week at age 25. Applicants should have H.N.C. (Elect.) and preferably served an engineering apprenticeship and have knowledge of electronics. Write giving details of age and experience to — The Employment Officer, Hoover Ltd., Perivale, Middlesex. 5872

ESTIMATORS required by large electrical contractors in Scotland. Applicants must have sound practical and technical experience in the contracting field. Superannuation scheme with prospects. Write fully.—Box 6015.

EXPERIENCED storekeeper required by E.W.F. wholesaler at Bristol. Good wage offered to man capable of organising goods in transit and trade counter, etc.—Box 7707.

FIELDEN ELECTRONICS Ltd. require a number of young electronic and/or Instrument engineers for their technical sales divisions. Excellent prospects for keen young men. Write stating full particulars of education and previous experience to — The Sales Director, Fielden Electronics Ltd., Paston Rd., Wythenshawe, Manchester. 5972

FIRST and second class linesmen required in Northern England. Experienced in all stages overhead line erection. Hourly rates 3s. 11½d. and 3s. 8½d. Out allowance paid.—Box 7719.

FOREMAN wanted for Central London contractors. Lighting, power, breakdown experience. Permanency.—Box 7716.

INSTRUMENT manufacturers in Harlow New Town Essex, have a vacancy for a tester with relays and process timers experience. Housing accommodation available.—Box 5727.

INSTRUMENTATION division require draughtsmen for careers in automatic control engineering. Age 25/30, minimum O.N.C. and preferably experience in electrical control schemes. Apply—Personnel Manager, Costain-John Brown Ltd., 40 South Street, London, W.1. 6058

JUNIOR electrical engineer required as assistant in section dealing with the design of power plant for telephone exchange contracts. Some knowledge of A.C./D.C. control circuits would be an advantage. Write giving full details of training and experience to — The Personnel Officer, Ericsson Telephones Limited, Beeston, Nottingham. 5831

MANAGER wanted for small Central London contractors. Estimating and clerical experience. Ex. opportunity to live man.—Box 7715.

JUNIOR electrical cable estimator for Surrey area. Write with details of experience and salary required to — The Personnel Officer, Hackbridge Cable Co. Ltd., Kelvin Works, Hackbridge, Surrey. 5995

JUNIOR electrical engineering draughtsman required for London consulting engineers' office. Must be experienced in drawing office preparation of industrial lighting and power installations. Education up to O.N.C. level. Five-day week. Pension scheme. Please reply to—Box 6059, giving details of previous experience and salary required.

KEEN young sales engineer required as Lancashire representative by manufacturers of all forms industrial m.v. switchboards, cubicles, control panels, substation switchboards, feeder pillars, etc., with full range heavy duty combination fused switches to 800 amps. and full industrial and domestic range of fusegear. Give details of experience in confidence to—Managing Director, Dennis Switchgear, Fleming Road. Speke, Liverpool. 5950

LIGHTING engineers required for London office of Ekco-Ensign Electric Ltd. Applicants must be well educated and conversant with modern practice. Apply—Senior Lighting Engineer, 45, Essex Street, Strand, London, W.C.2. 5922

MECHANICAL engineer required by cable works for production machine experimental and development work. Minimum qualification H.N.C. Age limits 30 to 40 years. The prospects are good and this is an opportunity for a man who likes to see the results of his ideas put into practice. Commencing salary according to qualifications and experience. Pension scheme. Apply in confidence, giving particulars in chronological order, to—Works Manager, Southern United Telephone Cables Ltd., Dagenham Dock, Essex. 6013

METROPOLITAN-VICKERS ELECTRICAL Co. Ltd., Trafford Park, Manchester, 17, have vacancies for servo engineers with some practical experience in electric servo and control circuit design and application. Qualifications required, a degree or Higher National Certificate. Applicants should not be less than 26 years of age. The posts are permanent and pensionable. Salary according to qualifications and experience. Apply in writing to the Personnel Manager, marking envelope "Servo Mechanisms." 215

PLUMBER-jointer required for work overseas. Must be fully experienced in all branches. Write stating age and giving details of experience to—Box 5858.

QUALIFIED electrical engineer required for hydro-electric power undertaking in Northern Nigeria, 4,000 feet above sea level, pleasant climate. Comfortable furnished quarters provided, first class passages for self, wife and two children, or equivalent benefits if children remain at home. Good salary and pension scheme with liberal leave after 18 months' tour. Apply stating age, full qualifications and experience to—Box 1051, The E.C. Advertising Co., 54, Old Broad Street, London, E.C.2. 5762

QUALIFIED electrical engineer required for position of chief electrical engineer with company situated London manufacturing electrical switches and control gear. Age between 30-40 and applicants must hold electrical degree. Write stating age, qualifications, experience and salary required.—Box 5923.

QUALIFIED engineer (British), age 22-25, with degree or equivalent and workshop training, required by company (London district) whose activities will enable experience to be gained in high-voltage insulation practice. Submit details to—Box 5951.

RADIO CENTRE require experienced salesmen. Excellent salary. Permanency.—33, Tottenham Court Road, London, W.1 (Tel. Museum 6667). 6016

REPRESENTATIVE required for South of the Thames and London South Eastern Electricity Board area. Pension scheme in operation. Car owner preferred but not essential. Progressive position. Apply in strict confidence, giving full details of experience, age, salary, etc., to—Box 6017.

SALES engineer required by leading manufacturer of comprehensive range of industrial instruments and process control equipment for direct representation in the Birmingham area. Applicants should have good technical background and some flair for applications. Salary commensurate with qualifications and previous experience.—Box 5973.

RESIDENT maintenance electrician required at Guy's Hospital, London, S.E.1. Experienced in A.C./D.C. generating equipment and general electrical engineering. Must have served recognised apprenticeship. Full trade rates, superannuation. Write or call — Chief Engineer. 6018

SALES engineers, D.C. and A.C. motors and control gear, required London and Birmingham areas. Outside sales experience essential. —Box 5952.

SALESMEN required by fluorescent lamp manufacturers. Training and assistance given. Sal., comm. and expenses.—Box 5953.

SENIOR and junior draughtsmen required, with experience of power transformers. Experience on on-load voltage regulators an advantage. Good salary, rates above A.E.S.D. minimum, contributory pension scheme. Apply, stating age, experience and salary required, to —Brentford Transformers Ltd., Kidbrooke Park Road, London, S.E.3. 5832

SENIOR assistant engineer required. Candidates must be Corporate Members of the Institution of Electrical Engineers with wide experience of the various forms of electrical work found in all types of hospital accommodation, including lifts, telephones, call systems and all systems of conduit work, and have the ability to negotiate suitable tariffs with the Supply Authority, be capable of preparing specifications and designs, etc., and organising the running of an electrical section. Salary £875 × £30 to £1,025 plus £40-£50 London weighting. Apply giving age, qualifications and experience, with names of two referees, to—Secretary, North West Metropolitan Regional Hospital Board, 11a, Portland Place, London, W.1, by 24th November. 6019

SENIOR designs draughtsman. Must have some knowledge of drawing office practice in addition to varied design work associated with high-voltage switchgear. Applications giving particulars of age, experience and salary required to—Box 5996.

SENIOR draughtsmen required by the Sturtevant Engineering Company Ltd., Southern House, Cannon Street, London, E.C.4. In this instance we need primarily men experienced in the design and layout of sheet metal ducting, dust collecting plant, heating and ventilating, air conditioning and fan work. Applicants wishing to make a career in the drawing office will be given special consideration and it should be noted there is no age limit. Five-day week. Pension scheme. Apply giving full particulars of age, education and experience. 6060

SENIOR electrical design draughtsman experienced in the layout of power, lighting and instrument installations for work on oil refineries and chemical plants. Applicants should have completed a recognised engineering apprenticeship and possess H.N.C. or O.N.C. Experience in flashproof installations an advantage. Salary above average, 5-day week. Generous pension scheme. Address full details career to—Head Wrightson Processes Limited, 24/26, Baltic Street, London, E.C.1. 5859

SHIFT charge engineer for electricity supply undertaking in Bagdad. Applications are invited from suitably qualified engineers, preferably between 25 and 35 years of age, who have had experience in the operation of a power station of at least 15,000 kW, with medium pressure boilers. Salary £1,000 to £1,200 per annum, plus high cost-of-living allowance. Free house with heavy furniture will be supplied or a monthly house allowance of £12 in lieu. Three-year contract, renewable, with first class passage each way for successful applicant and family (if married). Three months' leave on full pay in U.K. on completion of 24 consecutive months in Iraq, first class passages being paid.—Box 5969.

SWITCHGEAR sales engineer (senior), preferably with knowledge of overhead line gear, required for London and Home Counties area to assist present London manager. State age, training and salary required. Apply—Reference WEB/-, Switchgear & Equipment Limited, Banbury, Oxon. 5860

TIME study and rate fixing engineer. Applicants, between the ages 25 to 35 years, must have had experience in this type of work and be conversant with trade union procedure. Salary according to age, qualifications and experience. Pension scheme. Apply in confidence, giving particulars in chronological order, to—Works Manager, Southern United Telephone Cables Ltd., Dagenham Dock, Essex. 6012

TECHNICAL assistant. Young man, age 20-30 required for technical and production work in an electric lamp factory. Experience of lamp manufacture is not necessary, but some knowledge of chemistry is essential. Apply by letter, giving full particulars, to—Mr. Fenn, Cryselco Limited, Electric Lamp Manufacturers, Woburn Road, Kempston, Bedford. 5924

TECHNICAL assistant required for electrical test and development laboratory. Suitable for man 20-25 who is progressing towards O.N.C. or H.N.C. Location London, E.18. Particulars to—Box 5809.

TECHNICAL assistant required in the Manchester district for work on the development of electrical appliances, primarily domestic cookers. The applicant should possess a good practical knowledge of such work, together with a strong interest in theory. Arrangements can be made for continuation of studies, which will be encouraged. The salary offered will depend on the qualifications of the applicant.—Box 6061.

TECHNICAL assistants are required in the test and research department of a leading cable manufacturer in North London area for research and development with supertension cables. One vacancy involves work in the field and the applicant must be prepared to travel. Previous experience not essential. Educational requirements, engineering degree or H.N.C. Applicant should have completed his National Service. Write giving age, experience, details of education and salary required to—Box 5840.

TECHNICAL clerk to handle incoming orders in office of automatic temperature control manufacturer near London. Electrical background necessary. Age up to 50.—Box 5970.

TECHNICAL staff required for the large new "B & R" relay factory shortly opening at Harlow, Essex, including sales engineers, experimental engineers, etc. Relay experience not necessary, but a good knowledge of the fundamentals of electricity and physics essential. Houses will be made available. — Besson & Robinson Ltd., Kidbrooke Park Road, London, S.E.3 (Lee Green 8541, Ext. 20). 5998

THE "ELECTRICAL REVIEW" has a vacancy for a qualified technical editorial assistant, age about 30; university graduate and/or corporate member of I.E.E. Should have had manufacturing or electricity supply experience and be able to write. Superannuation scheme. Applications, which will be treated in strict confidence, should be sent to—The Managing Editor, "Electrical Review," Dorset House, Stamford Street, London, S.E.1. 7670

TRANSFORMER coil winders required. Experienced and partly trained. Excellent conditions and rates. Permanent and progressive posts. Apply—Transformers (Watford) Ltd., Sandown Road, Watford 6214. 5925

TRANSFORMER design and development engineer. Progressive appointment with company manufacturing up to 30 MVA in London area. Power transformer experience with degree or equivalent essential.—Box 5999.

TRANSFORMER designer required by manufacturers in North-West London. All-round experience with electronic and power transformers up to 250 kVA essential. Housing assistance if required.—Box 6020.

WELL-known electrical manufacturing company has a vacancy for a sales engineer for electrical rotating machinery in Sheffield. Successful applicant must be a trained electrical engineer with O.N.C. as a minimum qualification and with previous sales experience in the area covered. He will work from the company's existing branch office. Remuneration by salary and expenses. Non-contributory pension scheme. Apply—Box 5730.

WORKS manager required by a leading company manufacturing transformers near London. The appointment calls for a top-level executive of proven experience who would be directly responsible to the board for the co-operation and control of all aspects of production and of production services. This is an exceptional opportunity and calls for an exceptional man able and willing to plan and effect expansion. Age, qualifications and all relevant details to—Box 65, R. Anderson & Co., 14, William IV Street, London, W.C.2. 5954

YOUNG man required with some experience of electrical industry as order clerk in firm of electrical wholesalers. S.E. London area. Must have a good personality and be outside National Service group.—Box 6000.

WIREMAN wanted. Call—Brice, 180, Drury Lane, London, W.C.2. 6062

YOUNG assistant electrical engineer required for responsible work on impulse test plant. Duties will include general testing, development and research on lightning arresters and fusegear. Progressive post for keen and energetic engineer. Reply stating salary, qualifications, experience and age to—EMP Electric Ltd., Garman Rd., Tottenham, London, N.17. 5889

SITUATIONS WANTED

ADVERTISER with thirty years' varied experience electrical installation and appliances, desiring change, seeks responsible position as manager, assistant manager or London representative.—Box 7698.

A.M.I.E.E. (38) wishes 2 days work weekly in Kent or London area. Particularly assisting contractor with design and installation of building services.—Box 7728.

CHARTERED electrical engineer, age 41, assistant to director of mechanical-electrical products and export organisation, wide commercial, technical experience, seeks position of buyer, sales manager, or would entertain business propositions.—Box 7721.

CONTRACTS manager, Assoc. I. E. E., M.A.S.E.E., seeks post, possible director/partnership. Extensive experience contracting, consulting, administration. London or S.W.—Box 7705.

ELECTRICAL contractor, aged 43, disposing of business for personal reasons, requires position in electrical industry abroad. Good general experience, including commercial experience of aircraft and automobile electrical equipment.—Box 7730.

ELECTRICAL engineer seeks appointment with established London contractor as manager/engineer, adaptable personality, wide experience, design of schemes, estimating and supervision to final invoicing, correspondence, etc.—Box 7726.

ELECTRICIAN seeks any work overseas.—Box 7694.

INSTALLATION engineer (43), wide experience at home and overseas. Supervision, planning and complete handling of large industrial and general contracts. Full details on request. London area or abroad.—Box 7704.

KEEN, energetic man seeks situation sales organisation and/or representative electrical or engineering trade preferably. Own car, willing to travel distances.—Box 7731.

PLUMBER-jointer desires change. Many years' wide experience. All types up to 33 kV. U.K. or overseas.—Box 7732.

SALES engineer (45), established conn. London area, seeks change or sound agency. Exp. control switchgear and some electronics.—10a, Ditchling Rd., Brighton (61509). 7711

SOUTH Africa. Representative lamps, cables and accessories, returning S.A. early 1955, offers services any capacity. 20 years' U.K. experience. Excellent references.—Box 7734.

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ONE 50-h.p. Squirrel Cage Motor, B.T.H., 400 v., 50 c., 1,500 r.p.m.
One B.T.H. Rack Starter with ampmeter for above.
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Two 2-cylinder Diesels as prime movers for alternators.

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1,250-kVA CROSSLEY 8-cylinder, 300-r.p.m. Diesel Engine and Alternator, voltage to suit requirements.
900-kVA ENGLISH ELECTRIC 8-cylinder, 428-r.p.m. Diesel Engine and Alternator, voltage to suit requirements.

ALTERNATOR FOR EACH OF THE FOLLOWING ENGINES IS SUITABLE FOR 400 VOLTS, 3-PHASE, 50 CYCLES, WITH CONTROL PANEL AND AUTOMATIC VOLTAGE REGULATOR.

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131-kVA BLACKSTONE E.P.V., 4-cylinder, 600 r.p.m.
75-kVA GENERAL MOTORS Model 671, 6-cylinder, 1,500 r.p.m.
62.5-kVA PAXMAN Model 5 R.W., 5-cylinder, 1,000 r.p.m.
27.5-kVA LISTER, 4-cylinder, 1,000 r.p.m.
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Two 20-kW HILL & COMPANY/DELCO, 120 volts D.C., 167 amps., 1,450 r.p.m. Auxiliaries, etc.
Three 14-kW COVENTRY CLIMAX/McLURE & WHITFIELD, 230 volts D.C., 52 amps., 1,750 r.p.m. Auxiliaries, etc. Unused.
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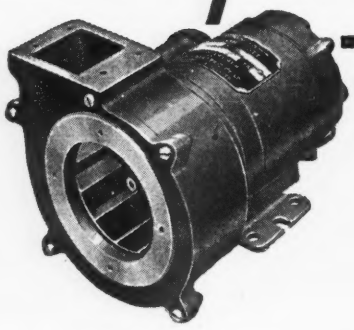

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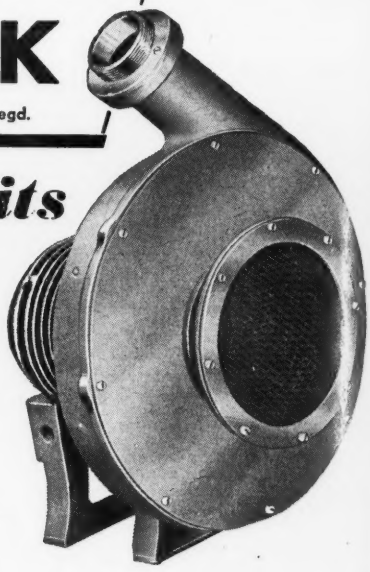

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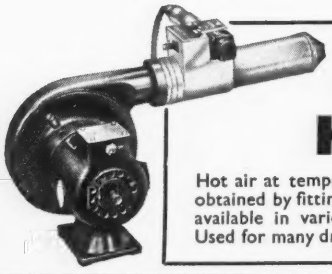

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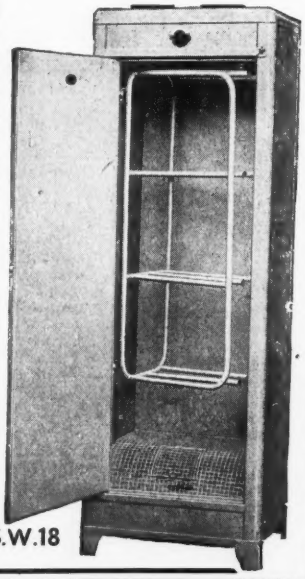

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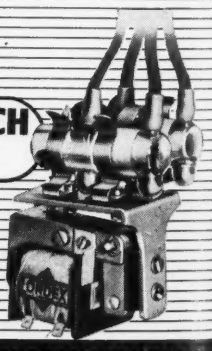

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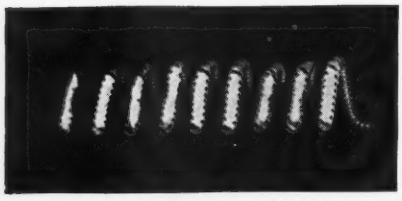

To take this completely unretouched photograph, the cathode was buried in a "Perspex" block, which was then polished down until the coated turns were cut, and a time exposure made with a projection microscope.

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